DOCUMENT RESUME

ED 413 180 SE 060 747

AUTHOR Ellerby, Richard S.
TITLE Mathematics for Young Learners: 60 Games & Activities for Ages 3 through 7.
ISBN ISBN-0-9623300-1-9
PUB DATE 1996-00-00
NOTE 109p.; Photographs may not reproduce well.
AVAILABLE FROM Spice of Life Educational Publishing, P.O. Box 21150, Boulder, CO 80308-4150 ($12.95).
PUB TYPE Books (010) -- Guides - Classroom - Teacher (052)
EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS *Arithmetic; Computation; *Educational Games; Manipulative Materials; Mathematical Concepts; Mathematics Activities; *Mathematics Instruction; Metacognition; *Number Concepts; Primary Education; Thinking Skills
IDENTIFIERS *Card Games

ABSTRACT

By studying and practicing metacognition, teachers and parents are instilling positive attitudes toward learning by teaching how-to-learn skills that prepare children for assessing their own thinking about learning as they become more and more developmentally prepared. This book stresses the strategies for thinking in mathematical terms without paper and pencil. It contains a series of mentally manipulative card games for children age three to seven. Many games have been modified to allow teachers to use them in self-directed centers within classrooms. Sixty games and 10 activities are included. These games are aimed at improving number sense, arithmetic, comparison, counting, and other important skills for elementary mathematics students. (ASK)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Mathematics for Young Learners

ED 413 180

Richard S. Ellerby, Ed.D.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

J.V. McGuire

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

60 Games & Activities for Ages 3 thru 7

BEST COPY AVAILABLE

Mathematics for Young Learners

60 Games & Activities for Ages 3 through 7

By Richard S. Ellerby, Ed.D.
Principal
William Lopez Elementary School
Fort Collins, Colorado

Spice of Life Educational Publishing

Mathematics for Young Learners

Sixty Games & Activities for Ages 3 through 7

By Richard S. Ellerby

Copyright ©1996 by SPICE OF LIFE EDUCATIONAL PUBLISHING ng
Rohr P.O. Box 21150 • Boulder, CO 80308-4150
303-441-5116

All rights reserved. No part of material protected by this copyright notice may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without the written permission of the copyright owner.

Library of Congress cataloging in publication data

Ellerby, Richard S.

Mathematics for Young Learners: Sixty Games and Activities for Ages 3-7
by Richard S. Ellerby

ISBN 0-9623300-1-9

1. Math
2. Elementary Education

CIP # 95-068460

4

Without the continual challenge to stay ahead of my grandchildren–Tyson, Kara, Ryan, Cody and Kyle–I never would have completed this book.

Preface

When are you going to write a book about these math games? How can I learn to do those card games with my child? Will you help me set up a math center in my classroom?

These and numerous other questions have been passed to me during the past five or six years that I have been developing card game math skills for young learners.

As an elementary school principal, I have observed and learned over time that many children come to kindergarten with a sense for mathematics. The disparity among the have's and the have-not's is much greater than age and maturity would dictate. Some parents really work at developing number concepts, but few try to teach.

To my knowledge, a tool has not yet been developed to aid parents in teaching math to preschoolers—until now.

Appropriately so, educators believe it does more harm than good to rush children into formal learning activities. In kindergarten or preschool instruction generally is geared to readiness development. Having been involved in a Montessori-type, hands-on kindergarten program for many years, I have gleaned a broad connotation for the term "development." For some teachers it means that children learn at different rates, and instruction must be individualized to meet their needs. In this environment an attempt is made to provide enrichment through a broad range of manipulative materials, responsibility for making choices, learning from each other or a cooperative group, and opportunities for one-on-one direct teaching. One-on-one is so efficient that more can be taught in 15 minutes than three sessions of hour-long, entire class instruction. This approach allows the parent/teacher the opportunity to determine how a learner solves problems, sequences, transfers information, organizes thoughts, etc. Unfortunately, this is not the typical kindergarten philosophy.

The educational catch-word nowadays is metacognition, which means one can learn to think how to think. In essence, you also are instilling positive attitudes toward learning by teaching learning how-to-learn skills that prepare your child to assess his/her own thinking about learning as he/she becomes developmentally more and more ready. Developing a habit for thinking critically does not come about naturally—it must be cultivated and nurtured. Soon the child comes to realize that learning is within his/her control, and taking risks does not necessarily lead to failure. Too many of our public school students will not take risks . . . perhaps this is also ingrained in many adults.

This book stresses the strategies for thinking in mathematical terms without paper and pencil. I have worked out a series of mentally manipulative card games for children aged three to seven. Each game has been validated at home with my five grandchildren; handicapped children in special education classes; preschoolers; and kindergarten, first, and second graders in my school. Many games have been modified to allow teachers to use them in self-directed centers within classrooms.

Conditions for Learning

I have taken the various conditions for learning and related them to mathematics in order to illustrate how parents can supplement and reinforce the card games herein described. Knowing this, it is possible to paint a broader picture of responsibility in the teaching process.

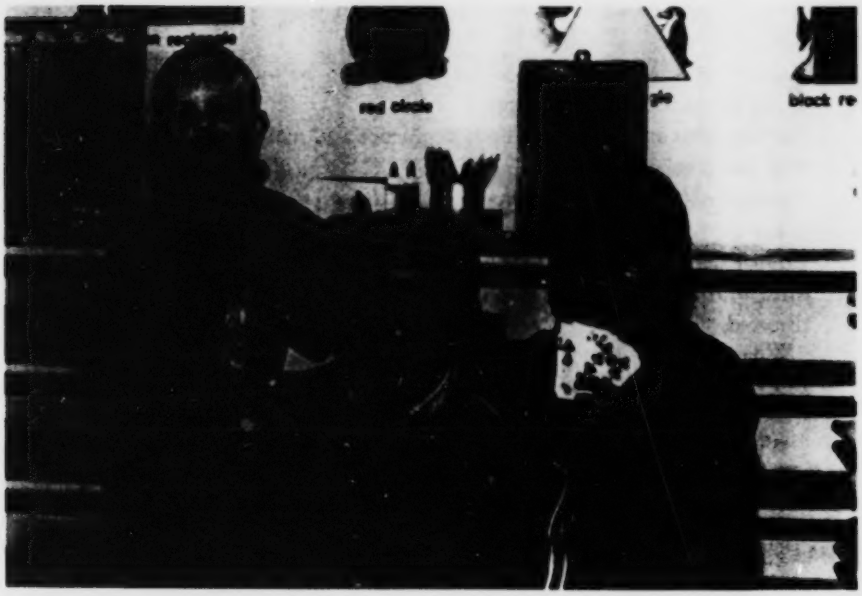
1. Immersion: Virtually inundate the child with mathematics. Such potential sources include nature/homes, churches, books, people, signs, advertisements, newspapers, television, posters, etc.
2. Demonstration: The functional use of math in everyday life. Examples would be inches/feet to grow on a growth chart, miles to drive on a map or odometer, hours or minutes in a day, days or weeks in a year from a calendar, channels on the television tuner, your place in line, prices in the stores by dollars and cents, number of items, measuring things to cook or build, card games to play, etc.
3. Responsibility: Never do for the child what he/she can do for himself/herself. Children must be allowed to manipulate and learn by doing whenever possible.
4. Expectations: Make allowances for the child to be wrong. Accept and expect mistakes—encourage risk-taking.
5. Employment and Use: Take time to practice and receive specific feedback—the trial and error stage.
6. Approximation: Allow and expect the child to experiment, guess, estimate, and make quick calculations to develop the concept of about how many.
7. Engagement: Involvement for a reason . . . developing ownership and assurance with a task. This is the ultimate in learning: when a child becomes self-directed.

What we know about effective teaching, complemented by motivation (which is the glue that holds all this together) and having a good time (which is everyone's basic desire), has been incorporated into this home-math curriculum. However, to assume that every parent is going to move comfortably into the role as facilitator would be misleading. Experience says that some parents do not have the patience or perseverence to work directly with children. Conversely, some children have a limited attention span and learn at very different rates. My suggestion is to give dad a chance to improve his communication skills. Just keep in mind what psychologist Benjamin Bloom said several years ago: "Any concept can be taught at any age if presented in an appropriate manner."

Seriously, the question to be answered is, "How is it possible for a significant adult to package learning so the child (learner) keeps coming back for more?" Since teaching, like learning, is not intuitive, the step-by-step approach should lead most parents through the formative, doubtful, or hesitant stage. Do not believe that experienced teachers learn this approach faster and easier. Practice

with intent makes the difference. Watching you and your child blossom from lesson to lesson will build mutual confidence. That's fact, not theory.

Children are not born intelligent, only with the capacity to be so. The activities illustrated in this book provide the stimulation for learning to take place. The more experience, the more intelligence. Who, then, controls these early experiences? The answer, many times, is television when it should be mom, dad, or mom and dad as a team. Perhaps the real benefit of this program is not math or critical thinking . . . rather family bonding.



BEST COPY AVAILABLE

About The Games

The games herein described have been sequenced from easiest to more difficult so they can actually be introduced at any age level. One builds on and reinforces the next. Some children will move more slowly than others depending upon their chronological age and/or maturity. In most instances, girls will be more advanced than boys by at least six months.

Since fathers typically spend less time with their child(ren), these games provide the ideal communication vehicle to spend quality time together. Perhaps, more than anything, this is the key to why this home instruction plan works. This is not just dad's exclusive territory, but mom, big brother or sister, and grandma and grandpa can get into the act. Nearly all the games can be played with more than two players, however, one adult needs to set the rules and control the game.

Having played each of these games hundreds of times with my grandchildren and school-age students in grades one and two, including special education, I train parents, whenever possible, to work with their children at home or as volunteer resource teachers at school.

A comment from the local newspaper, January 1995, seems to be especially appropriate to the message I try to deliver: "If educational achievement were judged to be as important as participation in sports, children would spend an extra two hours a day to improve academic skills. Parents would assist them with this task as eagerly as they now commit to acting as sports chaffeurs, coaches, and sideline cheerleaders."

Regardless of a child's age, I would suggest beginning with the first game–Mommy, Daddy and Little Boy. This game was not an original but came about when I was working with my grandson, Tyson, who was six at the time. His little brother, Cody, three, kept complaining that I never spent time with him playing card games, so I included him in the games as well. Last week I introduced the game to a five-year-old special education student in a preacademic transition class at my school. I was able to keep his attention for nearly 30 minutes. He was having so much fun showing me what he could do that he forgot he was learning.

As I developed my own skills with both grandchildren at home, either playing a different game or modifying one game to challenge both, I found that it was possible for me to work with five or six students at different levels at one time in a classroom setting.

Most of the games would not be challenging and, therefore, susceptible to boredom if the time element was not introduced early. As a child learns a game with unlimited time, the level of difficulty and, thus, the challenge is increased by limiting the response time. The adult in charge of the game may ask the child how much time he/she wants, or may simply suggest five seconds, based on past experience.

The most critical part of this entire relationship is that the child must perceive that he/she has a chance to win. Better yet, he/she should win more than he/she

loses. For some children it may be necessary to win nine of ten games. Others are okay with five of ten, but *never* should they lose consistently. Because card games involve the element of chance, they make the perfect choice of manipulatives. Scores should be kept by the child giving one point for each game, going to preferably five or a maximum of ten points. Most children do not require a reward for winning. Winning is important, but it should not be the emphasis. It is SUCCESS that takes over and keeps the child coming back for more.

It should not be necessary to coerce your child to play cards with you if you remember the following:

1. The game (a series of rounds) should last less than 15 minutes in the beginning. Adjust this to the learner's attention span as needed.
2. Games should be played only three or four times a week.
3. The learner should perceive the game as fair to both parties—that they are not being *allowed* to win.
4. The game must be developmentally appropriate. Do not move too fast, but play until the child's response time is down to two or three seconds.
5. Considerable praise and recognition for learning successive skills should be given by the adult in charge. Put-downs are not allowed.

A Look Ahead

To keep yourself involved, interested, and motivated is absolutely essential. You have no doubt heard that a teacher teaches what which he/she enjoys! You need to get into the games as a family. As with reading, you simpy turn off the television and devote time directly to your children.

In addition to the more formal card games introduced in this book, it is important to reinforce number concepts, i.e., counting, simple adding and subtracting. Be assured, your child can pick up the numeration system much more rapidly than he/she can phonics and word attack skills. There is little doubt that a combination of successful experiences, together with a nurturing, caring parent relationship, leads to the development of a strong self-esteem. What follows may sound incredulous, but research has suggested that a child's personality is 80 percent developed by the time he/she is five years old. Whoever believes that young children should experience failure deliberately should not read beyond this point. It's enough that about 50 percent of marriages end in divorce and single-child families are the norm. We do not have to design more coping "opportunities" into an already congested early childhood malady.

From personal experience, the games of Gin Rummy, Blackjack (and 31), and Cribbage can be taught and fully conceptualized by age six. All five of my grandchildren are in school, ranging from fifth grade to kindergarten, and all are at the top of their class in all academic areas—not just mathematics. I had taught the oldest his multiplication tables by age six and a half when I began to wonder

BEST COPY AVAILABLE

for what purpose. It is more important to teach estimation, odd and even, negative numbers, problem solving, and general thinking skills than it is pure computation. Besides, if there were nothing new to learn in school, life could be boring for a child. As an adult, the same is true, but we usually get paid for being bored, and that keeps us motivated.

Although I have been tempted to expand my card games into higher-level, problem-solving skills, there are several factors that have prevented me from doing so. First, there is the problem of repetition already mentioned. Then there is the question of a card-centered curriculum in the public schools—what would John Q. Taxpayer think? Also, if it was really a worthwhile idea, why hasn't someone else done it already?

It is time to raise the expectations we have for ourselves and our children. Let me cite an incident that relates to the worthwhileness of this effort. As I was first writing this section, my first-grade grandson brought home his midyear report from his first-grade teacher, Mr. Schiola. On it the teacher wrote, "Cody has an obvious strength in math and continues to amaze me with his thought process."

Well, hold on to your seats and get ready!

ONE BIG HAPPY by Rick Detorie

HOW ARE THE KIDS' REPORT CARDS?
PRETTY GOOD.
SID
ALTHOUGH RUTHIE NEEDS TO IMPROVE HER MATH.
I GUESS WE'LL HAVE TO START DRILLING HER.
YEAH, AS A MATTER OF FACT, SHE'S NEXT DOOR WHERE YOUR FOLKS ARE DRILLING HER RIGHT NOW.
A QUEEN AND A DEUCE.
THAT'S TWELVE.
HIT ME.

Table of Contents

Part 1

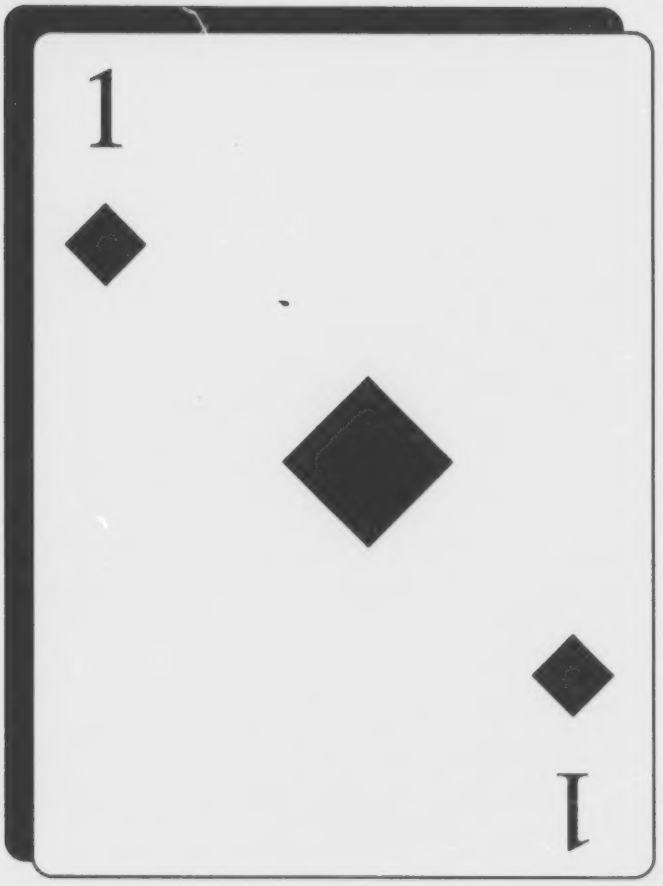
Game One: Mommy, Daddy, Little Boy (untimed) 3
Game Two: Mommy, Daddy, Little Boy (timed) 4
Game Three: Mommy, Daddy, Little Boy, and 1 5
Game Four; Mommy, Daddy, Little Boy, 1, and 2 6
Game Five: Largest Card 7
Game Six: Smallest Card 8
Game Seven: 0, 1, 2, 3 9
Game Eight: Mommy, Daddy, Little Boy, Family Counting 10
Game Nine: 0, 1, 2, 3, 4, 5 11
Game Ten: 5, 6, 7, 8, 9, 10 12

Part 2

Game Eleven: Numbers to 10 Plus 1 17
Activity A: Practice Counting On 18
Game Twelve: Doubles 0, 1, 2, 3, 4, 5 19
Game Thirteen: Doubles 3, 4, 5, 6, 7 21
Game Fourteen: Doubles 6, 7, 8, 9, 10 22
Game Fifteen: Doubles 0 through 10 23
Activity B: Doubles 25
Activity C: Doubles + 1 26
Game Sixteen: Doubles Plus 1 27
Game Seventeen: Doubles Plus 2 28
Game Eighteen: Doubles Plus 3 28
Game Nineteen: Sums to 10 29
Activity D: Adding to 10 31
Game Twenty: Differences to 5 33
Activity E: Adding With Dice 34
Activity F: Add or Find the Difference With Dice 35
Activity G: Determine the Difference With Cards 36
Game Twenty-One: Sums to 14 37
Game Twenty-Two: Differences to 7 37
Activity H: Add or Subtract Three Dice 38
Game Twenty-Three: Sums to 20 39
Game Twenty-Four: Differences to 10 39
Game Twenty-Five: Combinations to 20 40
Game Twenty-Six: Any Number Plus 10, 20, 30, 40 42
Game Twenty-Seven: Combinations of 10 43
Game Twenty-Eight: Matching 10s 44
Game Twenty-Nine: Concentration with 10s 45
Game Thirty: Combinations of 10 to 100 46
Game Thirty-One: Add a Deck of Cards 47
Game Thirty-Two: 21 48
Game Thirty-Three: Matching 11s 49

Part 3
Game Thirty-Four: The Ellerby Game 1, 2, 3 53
Game Thirty-Five: The Advanced Ellerby Game 1, 2, 3 54
Game Thirty-Six: The Reverse Ellerby Game 1, 2, 3 55
Game Thirty-Seven: I'm Thinking 56
Game Thirty-Eight: Double 9 Dominoes and Dice 58
Game Thirty-Nine: Double 12 Dominoes and Dice 60
Game Forty: Telling Time to the Hour 61
Game Forty-One: Telling Time to 5 Minutes 62
Game Forty-Two: Double Draw Difference 64
Game Forty-Three: 31 65
Game Forty-Four: Sums to 40 67
Game Forty-Five: Triples 68
Part 4
Game Forty-Six: Four-Card Addition 72
Activity I: Combinations to 24 73
Game Forty-Seven: Three-Card Combinations 74
Game Forty-Eight: Odd and Even 75
Game Forty-Nine: The Ellerby Game 1, 5, 10 76
Game Fifty: The Reverse Ellerby Game 1, 5, 10 77
Activity J: Pick Pocket 78
Game Fifty-One: Big Bucks 79
Game Fifty-Two: Difference: Red and Black 80
Game Fifty-Three: Negative Difference: Red and Black 82
Game Fifty-Four: Place Value 84
Game Fifty-Five: Place Value With Addition 85
Game Fifty-Six: Combinations of 15 or Magic Square 87
Game Fifty-Seven: Adding 0 to 100 88
Game Fifty-Eight: Combinations from 12 to 18 89
Game Fifty-Nine: Cribbage 90
Game Sixty: Junior Rummy 91
Answers to Activity I 93

PART



Read This Before You Begin . . .

As stated in the Preface, timing preferential to the learner is critical to motivating him/her as well as controlling the win-lose factor. Time is determined by lightly tapping your knuckles on the table and counting "one, two, etc." at about one-second intervals. Starting with each timed game, the decision must be made strictly by trial and error. The learner should win more than the parent but without realizing an advantage. The goal is getting to two seconds or less consistently.

Remember, it is not always necessary to achieve this "mastery" level before moving to the next game. If the learner has a short attention span, review is welcome.

It also must be remembered that each game may be played several different ways, and before moving ahead conceptually, it is important to develop a degree of self-assurance and competence on the part of the learner.

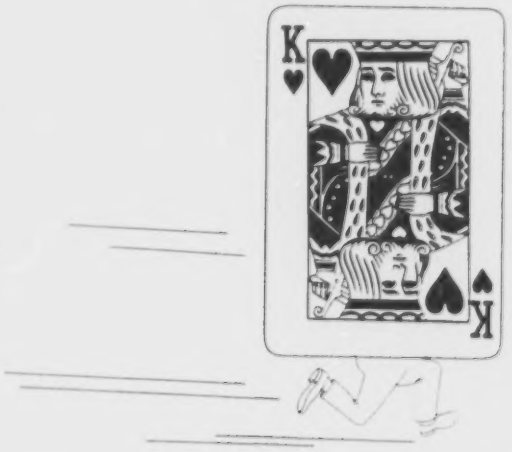
The earlier games move at a slower and more deliberate pace taking one step at a time. Later the games move in giant steps, and frequently one game may be played in two or three advanced forms. Do not start to play a new game until rereading the highlighted gems, guidance, and hints.

Rather than stumble through a game, perhaps making errors, practice ahead of time following sometimes complicated directions. Also, you may want to find an old used deck of cards as new cards are more difficult to manipulate.

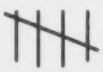
The Part I through Part IV divisions are given only as conceivable breaks in the difficulty of the games, not as a time line to be adhered to. All children will progress at different rates, the progression I describe as "magic."

Therefore, before you begin, read all Additional Guidance, Advanced Hints, and Gems. It will only take 30 minutes to get an essential overview, and you and your partner will be able to play the games more easily.

Now, let's get going!



The number of rounds played depends on the learner's atttention span. The more games played, the greater the opportunity for the learner to learn counting for meaning. By making a slash mark under the name of each player, the learner can practice being the scorekeeper. Show that five slash marks equals five:

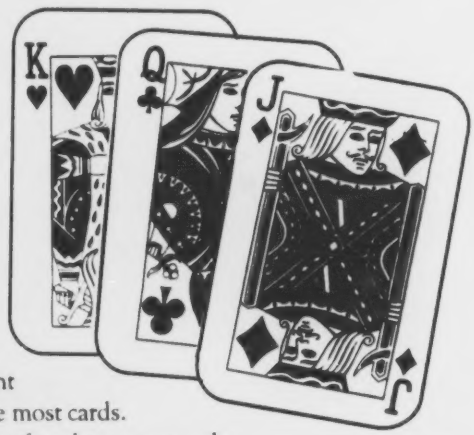


GAME ONE

Mommy, Daddy, Little Boy

(untimed)

1. Separate the 12 face cards from the deck.
2. Teach the difference between the jack (little boy), queen (mommy), and king (daddy). Look at the beard, moustache, color of hair, sword, flower, scepter, and any other distinguishing features.
3. Mix the 12 cards and display them to the learner one at a time.
4. If the learner identifies the card correctly, he/she keeps it and begins a pile, face down. If he/she doesn't recognize it, the parent keeps the card and makes a pile..
5. After going through the deck one time (playing one round), the parent counts each deck to see who has the most cards. Cards should be counted one by one, face down, to see who wins the round.
6. The first one to win five rounds wins the game.



Parents can support the learner by attentively listening and patiently responding.

Preschool children have what might be an innate interest in numbers.
—Bruer, 1993

GAME TWO

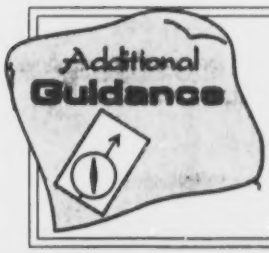
Mommy, Daddy, Little Boy

(timed)

1. Play this version the same as the untimed version, but establish a time limit of perhaps five seconds. This can be adjusted in order not to be too easy or too difficult. The learner should win most of the time but not all of the time.
2. Allow the learner to count the cards and manipulate them one at a time.

The learner will eventually gain small muscle control to pick up and stack the cards and then deal one or two at a time. Stacking the cards is done by picking up the cards in a tight group and placing them on a flat surface with the left hand loosely and folding them down with the right hand. The manipulative skills being taught will carry over to numerous school-related activities. Be patient. This is slow but essential progress.

Mixing (shuffling) is done by laying all the cards on the floor or table and moving them around with the hands, shifting from top to bottom. This is easier with only 12 face cards.



The parent may want to white out the "A" on the ace and replace it with a "1," but I have found that the learner will transfer from one to the other easily. Remember, the parent should usually "win" some cards. If not, the game is too easy or too much time is allowed.

GAME THREE

Mommy, Daddy, Little Boy, and 1

(timed)

1. Add the ace (1) cards to the jack, queen, and king, and teach the concept of 1. It is necessary to establish that A = 1 by pointing out only one heart, club, diamond, and spade (referred to as shapes) in the middle. You will be playing with 16 cards now.
2. Mix the cards and lay them down one at a time in front of the learner.
3. Play, as in Game One, using a predetermined time limit of 4-5 seconds and slowly quicken the pace as you play.
4. After the round is done, ask who has the most cards before counting, introducing visual estimation.
5. Count the cards. Ask who is the winner?
6. Keep track of rounds won using slash marks.

Counting seconds too loudly may distract the child. Also, it is best to play face-to-face sitting on the carpet.

It is not essential to teach the concept of heart, club, diamond, and spade. If and when the child asks, tell him/her.

Later the joker will be introduced as a zero. It may take a while for the concept of nothing to develop. As with the ace, the parent may want to place a "0" in the corners. Usually this is not necessary.

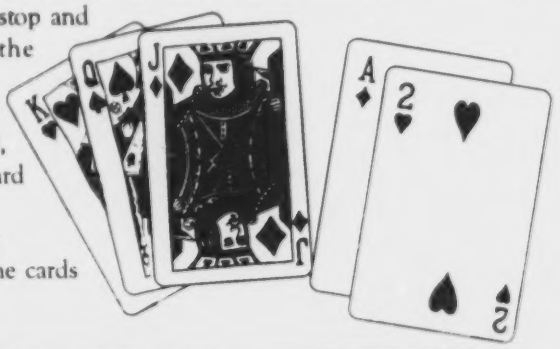
By age 5, most children develop other number skills in addition to counting. First, they learn to compare two numbers for size and can reliably report which number is larger or smaller. — Resnick, 1983

GAME FOUR

Mommy, Daddy, Little Boy, 1, and 2

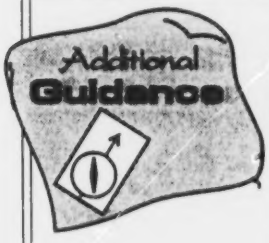
(timed)

1. Add the "2" cards to the jacks, queens, and kings, and teach the concept of 2s. (You should have 20 cards now.) Touch and count the two shapes in the middle of the 2 card repeatedly. Compare with two of anything available.
2. Use a predetermined time limit.
3. Mix the cards and lay them down one at a time. If a number card is not recognized, you need to stop and count the shapes in the middle again. By giving the correct response at the end of the time period, the correct name of the card is reinforced.
4. Ask who has the most by estimating, then count the cards to see who wins.



The natural sequence is to add the 3, 4, 5, 6, 7, 8, 9, and 10 (which will be done progressively in games 7, 9, and 11). By the time we get to 3, the face cards are eliminated from this game, because it becomes too cumbersome. . For some, this is easy; for others, difficult. By adding two jokers from another deck of cards, it is possible to have four.

The learner eventually will be able to recognize five closely clustered shapes without counting, i.e., dice and dominoes; six and above usually must be counted. Placing the learner's index finger on the shapes and counting together is excellent practice. Counting shapes should be done by directing the learner to start at the top and continue from left to right. This is a precursor to reading and a valuable transferable skill at a later time.



The learner may need help counting his/her own stack at the completion of each round, but it is an important part of learning to manipulate cards off the assembled deck one at a time, saying the number as the card is laid on the floor.

The concept of largest can be determined (learned) easier by counting out loud and touching the shape simultaneously. Soon there will be transfer from the quantity of shapes to the number in the corner, and a visual check without counting will be used. Of course, larger differences are more easily discernable (Example: 9 and 1; 8 and 2; 7 and 3).

The numbers 6 and 9 are easily confused because they appear right side up and upside down. Discuss this, cover the lower right number with your finger, and eventually the top of the card will be cued by the learner.

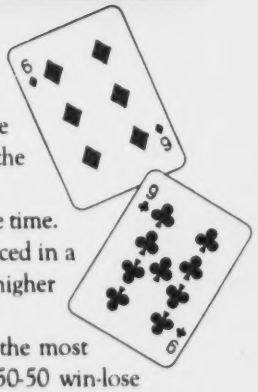
As this game progresses, eventually the number 8 in the corner will be perceived as larger than the number 7 in the corner of another card, and the concepts will build one on the other. At first, the shapes may key the learner's response.

Game Five and Six can be played intermittently as proficiency with Game Four develops.

GAME FIVE

Largest Card

(untimed)



1. Remove the face cards (king, queen, and jack). Leave in the joker (0), and spread the deck (42 cards) apart face down on the table or floor.
2. The parent and learner shall draw and turn a card at the same time.
3. Whoever has the higher card wins both cards, which are placed in a personal stack face down. In case of a tie, draw again. The higher card then wins all four cards.
4. When all the cards are drawn, count by 1 to see who has the most cards. Since this is a game of chance, there should be a 50-50 win-lose situation.
5. The first player to get the most cards for an appropriate number of rounds wins the game. Remember, 15 minutes is an average attention span.

The more difficult concepts of counting by 2 and counting backward (beginning 10, 9, 8 . . .) will be introduced in Games Nine and Ten.

Accept and expect mistakes, encourage risk-taking, and rely on trial and error as a great teacher.

GAME SIX

Smallest Card

(untimed)

1. Play this version the same as Game Five, but let the smaller card win. A different concept will be taught (and it also breaks the monotony).

Summary

To this point the teacher (parent) has taught similarities and differences (Mommy, Daddy, Little Boy); number recognition of 1 and 2; counted to at least 20; learned to mix (shuffle), collect, and stack cards (with great difficulty); count and manipulate one card at a time; and introduced the concept of largest and smallest numbers up to 10 (even though 3, 4, 5, 6, 7, 8, 9, and 10 may not yet be recognized for the value they represent).

GAME SEVEN

0, 1, 2, 3

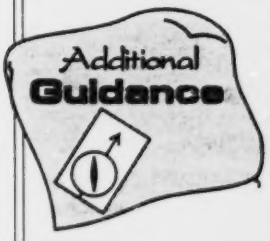
(timed)

1. For this game, use only two jokers and the ace (1), 2, and 3 cards. This will be 14 cards. Remember, the joker's value is 0.The concept of nothing (0) and three (3) may have been learned in Games Five and Six. If not, review them before proceeding with this game. The 0 can be presented as a hole with nothing in it. Connect your thumb and forefinger and look through. There's nothing there!

2. The concept of 0 will be presented again and again, so don't worry if it isn't picked up easily.
3. Follow the same procedure as in Game One, laying down the cards one at a time. If the learner identifies the card correctly, he/she keeps it in his/her personal pile. If he/she doesn't identify the card correctly, the parent keeps the card.

It may be necessary to review the idea behind timing (page 2) to control the win-lose factor.

At 2-1/2 years, children start to use number words in counting things, i.e., 1, 2, 3. By age three, they can accurately count the number in a set of visible objects. (Starkey et al. 1990)



It is fun to make up stories about the families:

"Mommy, daddy, and two little boys named Jack and John (four people, count them) went to the store and bought one can of pop, two candy bars, and three sticks of gum. How many things did they purchase?

John ate one stick of gum. How many sticks are left? How many items are left?"

There are limitless stories and combinations of people and things. To be meaningful, the learner should touch, feel, eat, and count real things. Cut a candy bar in half to introduce this concept. "You eat half, and I'll eat half." Pour only a half glass of milk or juice, etc.

GAME EIGHT

Mommy, Daddy, Little Boy, Family Counting

(untimed)

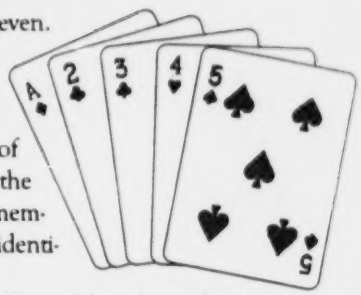
1. This game will use only the face cards. Sort them from the deck.
2. Review the visual differences and family names (mommy, daddy, and little boy).
3. Place the 12 cards face up in random order facing the learner.
4. Begin simply by asking the learner to pick up and hand you one mommy, then one daddy, then one little boy. Proceed to two mommies, two daddys, etc., reinforcing the concept of number versus quantity introduced in Game Seven. It will amaze the parent how soon the learner will be able to sort out two mommies, one daddy, and three little boys, which is an exercise in short-term memory.

5. Take turns having the learner give the parent directions as well. Model counting the cards. Give the learner six cards and the parent takes six cards. Count them.
6. Repeat all possible combinations to the ability of the learner. Unbelievably, many will not pick up the cards in the announced sequence but still will accomplish the task. It's fun to see how kids' minds work!

GAME NINE

0, 1, 2, 3, 4, 5

(timed)

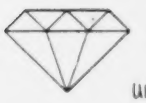


1. Add the 4 and 5 to the deck used in Game Seven. Teach the new cards by counting the shapes on them from top to bottom, left to right. You should have 22 cards now.
2. Play the same as in Game Seven, but instead of the parent dealing one card at a time, have the learner turn a card from a face-down deck. Remember, the learner gets to keep the cards he/she identifies correctly.
3. Because only the 4 and 5 cards are new, it is still possible to keep the timing to two or three seconds per card, and the learner will win.

Now that there are 22 cards it may be possible to introduce counting by 2. It is much easier for the learner to count to 10 than to 20. Stop at 20. The parent should model this when adding the cards won by pushing out two cards at one time so the learner can see them and count out loud. Early responses may be skip counting, which is saying the odd numbers silently; count "1" silently, then "2" out loud, then "3" silently, then "4" out loud, and so on.

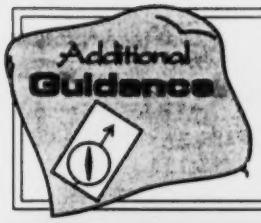
When the learner is able to manipulate the cards, transfer this responsibility to him/her.

Remember: This is no easy task. Be patient, and continue reviewing with Games Five and Six.



From research, reciprocal teaching is the most effective of all teaching techniques. It takes the form of a dialogue. Dialogue is a language game children understand, and it is a game that allows control of a learning session to alternate between parent and learner. It helps the learner to assume responsibility for his own learning. —Bruer, 1993

BEST COPY AVAILABLE



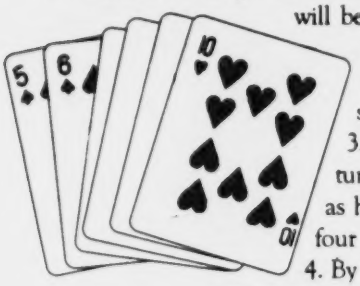
Skip counting can be reinforced simply by having the learner touch two shapes simultaneously with his/her fingers and count on by 2s. Example: 2 + 2 = 4, 2 + 2 + 2 = 6, 2 + 2 + 2 + 2 = 8, and 2 + 2 + 2 + 2 + 2 = 10.

GAME TEN

5, 6, 7, 8, 9, 10

(timed)

1. Add the 6 through 10 cards to the deck and remove the 0 through 4 cards. You will be playing the same as Game 9 but with 24 cards now.



2. Teach recognition of the 6-10 by counting shapes. Count them top to bottom and left to right.
3. Spread the cards face down and have the learner turn them over one at a time, again identifying them as he/she goes. At first, it may be necessary to allow four to five seconds.
4. By now, three different ways have been introduced to select cards: dealing them one at a time; drawing from the face-down deck; and drawing from a spread deck.

It is double reinforcing to have the learner trace and say the newly introduced numbers (write the numbers one-inch high on a plain sheet of paper and allow the learner to reproduce them). Some may be able to draw the numbers from memory. Reversals are to be expected. Don't overreact. Counting backward from 10 can be introduced at this point. Some children may be able to handle counting backward from 20. It is never necessary to go farther.

Strategies from learner to learner will not be the same. Stay with what works to reduce confusion.

Zack is not yet 4 years old.

The best teacher is a coach who diagnoses each play in order to improve performance.

Author's Note

SUPPORT MATERIALS

While writing this book, I have not tried to "sell" commercial games; however, one of my parents brought to my attention Monopoly Junior by Parker Bros. In the game players receive money from $1 to $5, and it fits in right about here developmentally. There also are tokens (cars and houses) to use in future activities included in this book.

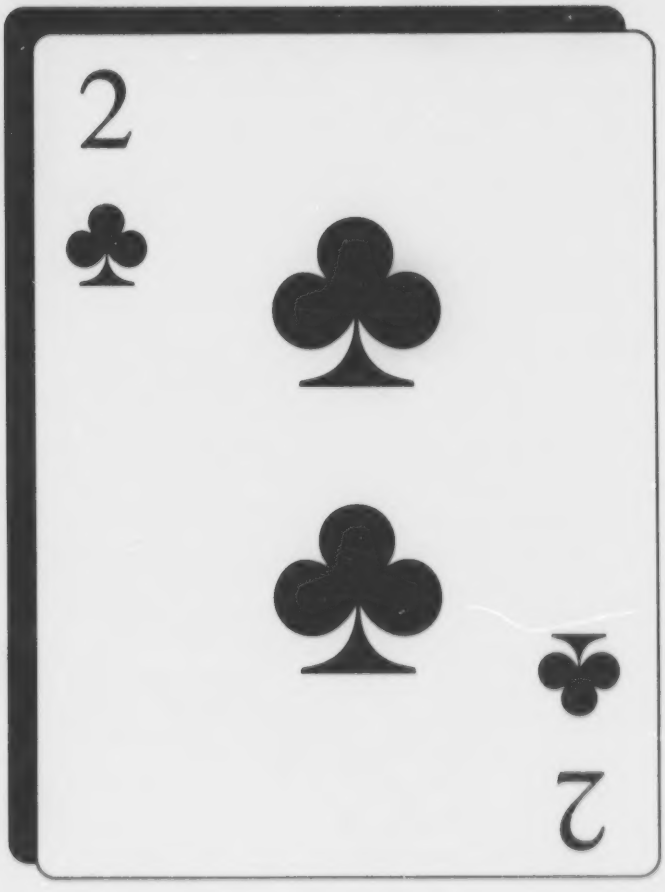
BEST COPY AVAILABLE

Summary

It is imperative that the learner sees 0-10 not only as numbers but also that they represent a quantity. Counting things around the house reinforces this concept.

Game One to Game Ten may have taken from two months to a year to complete depending on the beginning chronological age and maturity of the child. Pacing for success without boredom or frustration is critical. There is no doubt that some parents as teachers will feel more successful than others. Don't forget that one of the main reasons to get involved is to spend quality time engaged in direct communications with the child. Using a teaching-learning situation is one way to force the relationship. Most games purchased at a toy store do not hold the attention of either an adult or child, because there is no skill involved, limited diversity, no purpose established, and little learning takes place. It is no wonder that Nintendo took off. It encompassed all these features.

PART



Read This Before You Continue . . .

Up to this point it has been necessary to progress more slowly and deliberately, establishing a positive attitude toward mathematics and a trusting, yet fun parent-learner relationship. Game Eleven: Numbers to 10 Plus 1 / 1 More, is the most important concept taught, and the one most frequently omitted in classrooms. It sets the stage for most of what follows. The critical strategy that must be introduced is "counting on." This means starting with the large number and adding one more (and eventually adding 2 and 3 more). IMPORTANT: A child should be taught by placing his/her hand over the "big" card, saying its value, and then the parent asks, "What is 1 more?" Repeat by saying, "(the number) and 1 more is how many?" Do this frequently.

It may be necessary to show the ace (1) side by side with a larger card and ask the learner to touch the shape when counting on. There will be a tendency to say "1" rather than the correct response.

Begin with 2 and 1 more is 3, then 3 and 1 more is 4. Use the terms "1 more" interchangably with "plus 1." Decide which one best keys a response and stay with it.

It will be progressively more difficult to do larger numbers and 1 more. Use Activity A to complement this game. Introduce 2 more and 3 more using this activity board. (Game Nineteen: Sums to 10 will logically proceed from Game Eleven.)

Game Twelve is Doubles 0-5. Doubles is the second most important concept taught. Learning doubles is not really difficult; yet the practice is seldom included in any classroom.

A True Story

Nearly 30 years ago, in the summer of 1966, seven poor black preschoolers walked into an Illinois classroom and performed an astonishing feat. In front of a room full of university students and two film cameras, these children solved problems of addition, subtraction, multiplication, and fractions. They answered simple algebra questions.

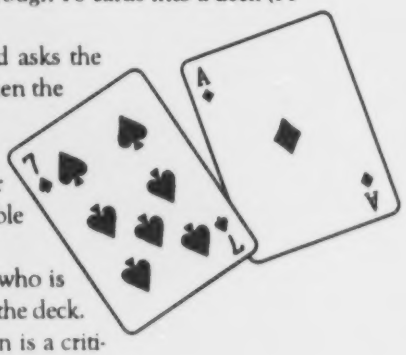
"I don't know if anybody has ever come close to doing what we did in teaching math to these disadvantaged kids," recalls their teacher, Sigfried Engleman, now an education professor at the University of Oregon. "They hadn't started first grade yet! That was from only 20 minutes a day of direct instruction."

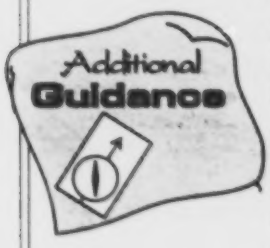
GAME ELEVEN

Numbers to 10 Plus 1

(timed)

1. Organize one joker (0) and the ace (1) through 10 cards into a deck (11 cards).
2. The parent plays one card at a time and asks the learner to think 1 more. For example, when the 6 card is played, the learner should say 7.
3. Use a predetermined time limit of five or six seconds per card. Soon you will be able to quicken the pace.
4. Keep score during rounds played to see who is the winner. A round is one time through the deck. The ability to add 1 more by counting on is a critical giant step.
5. Practicing using Activity A will help advance the child's skill to play 2 more and 3 more.





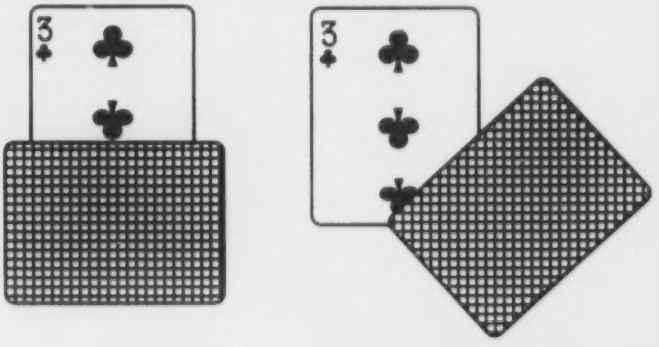
This game is a natural lead-in to the game of doubles which follows. It is important for the learner to get used to seeing only one card played and having mentally to add 1 more. This game can progress to plus 2 and plus 3. Do not go to plus 4. It also makes no sense to play the game of minus 1 or 1 less. Resist the temptation to do so. If necessary, when advancing the game, put down a 2 or a 3 adjacent to the played card so the learner can count up and visualize the process.

Children who have difficulty learning school arithmetic lack the initial representations of number and quantity needed to understand counting and comparing.
(Bruer, 1993)

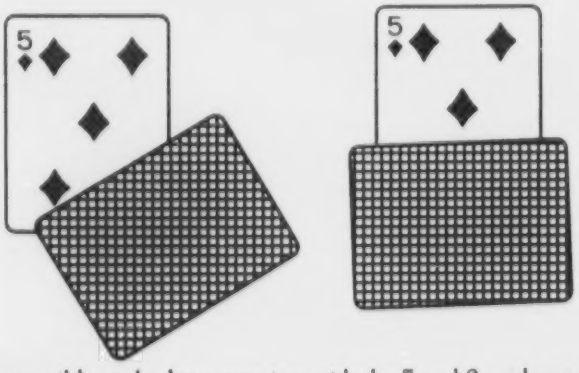
✷ ACTIVITY A ✷

Practice Counting On

Using the 3 card face up, cover up one shape with another card face down. Remove this card and count on to 3.



Using the 5 card face up, cover up one shape with another card face down. Remove it and count on from 4 to 5. Continue by counting 2 more from 3.



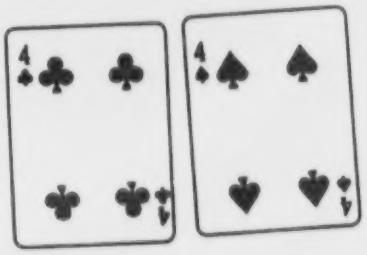
It is possible to do these exercises with the 7 and 9 cards, each time counting on from the large number. For example: 6 + 1 = 7, 5 + 2 = 7, 4 + 3 = 7 and 8 + 1 = 9, 7 + 2 = 9, 6 + 3 = 9, 5 + 4 = 9. It is important not to count on from the smaller number.

GAME TWELVE

Doubles 0, 1, 2, 3, 4, 5

(timed)

1. Organize the joker (0), ace (1), 2, 3, 4, and 5 cards into a deck (22 cards).
2. Lay a "0" on the floor and teach the concept of doubles: two 0s = 0, two 1s = 2. Follow with the 2, 3, 4, and 5 cards in sequence; two 2s = 4; two 3s = 6; two 4s = 8; two 5s = 10.
3. Reinforce doubles by having two like cards side by side. Have the learner put his/her hand over one card, say it, and count on by putting his/her finger on the shapes top to bottom, left to right.



4. Lay the cards out one at a time, beginning with a five- or six-second interval, adjusted to the learner. Cards "won" by the learner are kept on his/her deck. Those not won are put in the parent's deck. Usually this concept is learned quickly, and the eventual time allowed is one or two seconds (mastery level). Keep in mind that the learner should win most of the time but not all of the time.
5. Spread each player's deck and ask the question, "Who has the most?" to encourage estimation.
6. Count the cards by 1s, then 2s, then backwards.
7. Keep score by rounds played, perhaps five or more depending on learner's attention span. The reward for winning is intrinsic (within the learner). Restricting the time should keep the game scores close.
8. Teach the following jingle, provided by Sue Sonnenberg, a former associate of

Mastery of doubles will lead to the development of higher level thinking skills and strategies not usually taught in public schools. From this point on, observe how learning accentuates more learning and success is like a disease—it spreads rapidly.

In doubles, it is important not to play more than one card at a time. This requires an exceptionally sophisticated transfer to seeing visually one of something and imagining mentally twice that amount . . . a giant step so to speak.

Advanced Hints

mine, who put the concept into a right-brained mode:

One lonely lion feeling sad and blue
Double it, double it, that makes two.

Two baby gerbils gnawing on the door
Double it, double it, that makes four.

Three giant black ants carrying big sticks
Double it, double it, that makes six.

Four happy bluebirds sitting on a gate
Double it, double it, that makes eight.

Five little chickens following the hen
Double it, double it, that makes ten.

Note: You'll find the entire jingle on page 24.

The joy of learning is in itself the purpose for learning.

A second grader tutors a kindergartner.

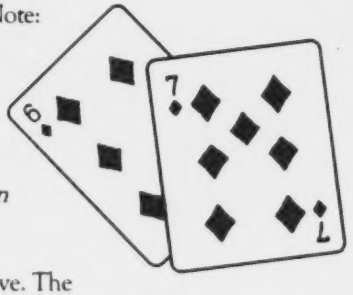
BEST COPY AVAILABLE

GAME THIRTEEN

Doubles 3, 4, 5, 6, 7

(timed)

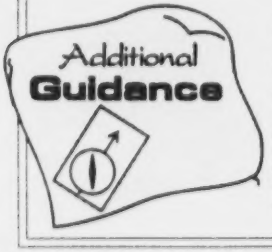
1. Sort the 3, 4, 5, 6, and 7 cards into a deck (20 cards).
2. Teach double 6 and 7 the same as in Game Twelve.
3. Teach the verses of the jingle for 6 and 7. (Note: to delve means to search.)



Six furry raccoons digging down to delve
Double it, double it, that makes twelve.

Seven dirty kittens licking their paws clean
Double it, double it, that makes fourteen.

4. Follow directions 4 through 7 in Game Twelve. The learner will not win the 6 and 7 at first. This keeps the game close!



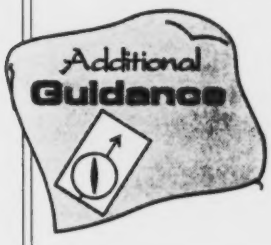
Use manipulatives or make up stories to play the Doubles games. For example, use a dozen eggs and allow the learner to put six in the box, then six more.

Make up a rhyme to enhance learning, such as, "My son's name, Kevin, rhymes with seven, and he is 14 years old." Even if it is not true, it works.

Practice Doubles and Skip Counting

You can continue to emphasize doubles by using the 4, 6, 8, and 10 cards. Cover up half of each card and ask for the correct response, then uncover the card and check by counting on.

The greatest hurdle to overcome is the parent's insecurity with the role of teacher. Yet the greatest satisfaction comes from learning this role.



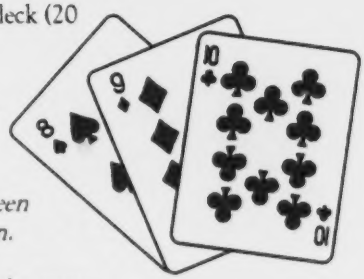
Typically the doubling of the numbers 7, 8, and 9 will be more difficult to learn, but it doesn't make sense to dwell too long on these three numbers. Other games will continually reinforce these doubles. This allows the parent to win legitimately once in a while.

GAME FOURTEEN

Doubles 6, 7, 8, 9, 10

(timed)

1. Sort the 6, 7, 8, 9, and 10 cards into a deck (20 cards).
2. Teach double 8, 9, and 10 as before.
3. Teach the verses of the jingle for 8, 9, and 10.



Eight baby beetles climbing on the screen
Double it, double it, that makes sixteen.

Nine yellow fat bees gathering 'round the queen
Double it, double it, that makes eighteen.

Ten little puppies eating food a plenty
Double it, double it, that makes twenty.

4. Follow directions 4 through 7 in Game Twelve.

An attribute learned at a very young age is the ability to recover from adversity (optimism).

GAME FIFTEEN

Doubles 0 through 10

(timed)

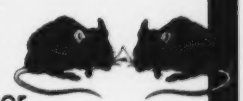
1. Sort the 1 through 10 cards into a deck (42 cards) and review all the doubles. Stay with this until the learner consistently wins with a two-second exposure.
2. Follow directions 4 through 7 in Game Twelve.
3. The following page contains the Double It jingle in its entirety. With the learner, practice and memorize it!

At this point the learner will be ready to count to 40 by dealing out one card at a time since there are that many cards in the deck. Allow him/her to manipulate the cards some of the time, unless it is too cumbersome for him/her. Using four 10s from the deck, it is possible now to illustrate counting by 10s to 40. Surprisingly, it is not that difficult to count by 5s either. It works well to use toothpicks sorted into eight groups of five. Using eight 5s taken from two decks of cards also is effective.

The real benefit of this program is not math, not critical thinking, rather family bonding.

DOUBLE IT

One lonely lion feeling sad and blue
Double it, double it, that makes two.



Two baby gerbils gnawing on the door
Double it, double it, that makes four.

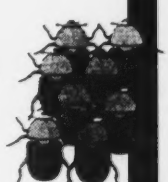
Three giant black ants carrying big sticks
Double it, double it, that makes six.

Four happy bluebirds sitting on a gate
Double it, double it, that makes eight.

Five little chickens following the hen
Double it, double it, that makes ten.

Six furry raccoons digging down to delve
Double it, double it, that makes twelve.

Seven dirty kittens licking their paws clean
Double it, double it, that makes fourteen.

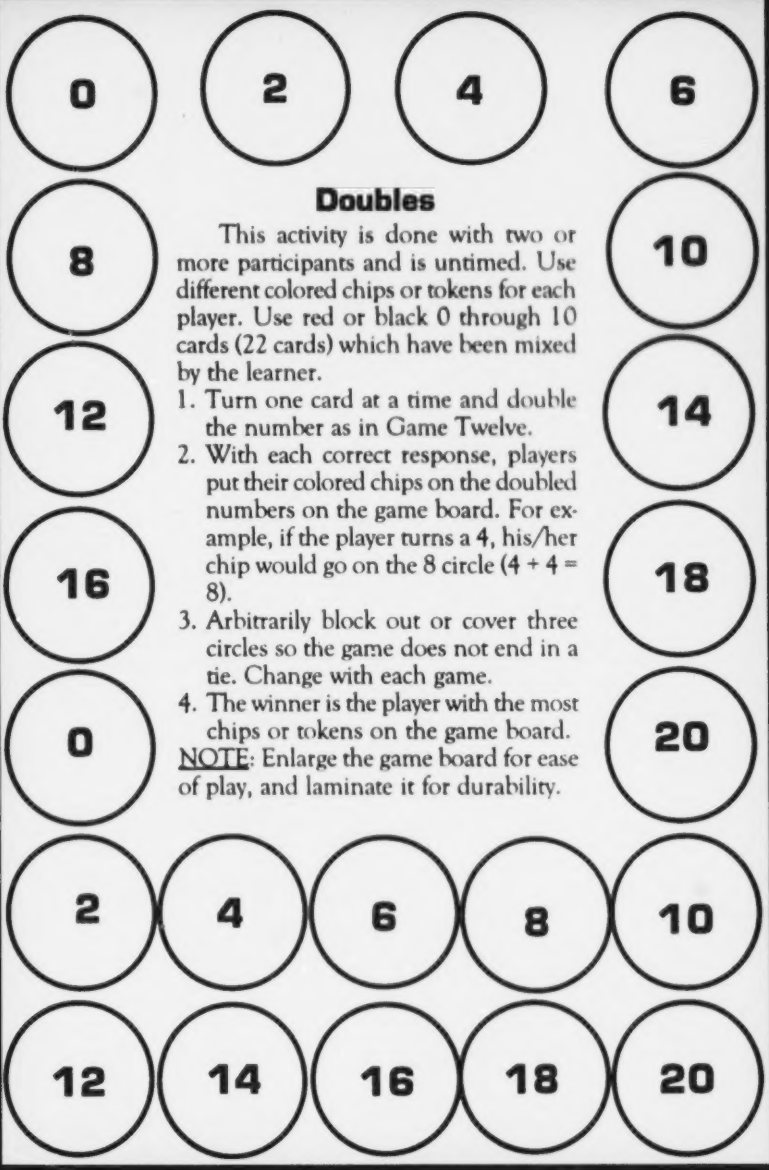


Eight baby beetles climbing on the screen
Double it, double it, that makes sixteen.

Nine yellow fat bees gathering 'round the queen
Double it, double it, that makes eighteen.

Ten little puppies eating food a plenty
Double it, double it, that makes twenty.

✶ ACTIVITY B ✶



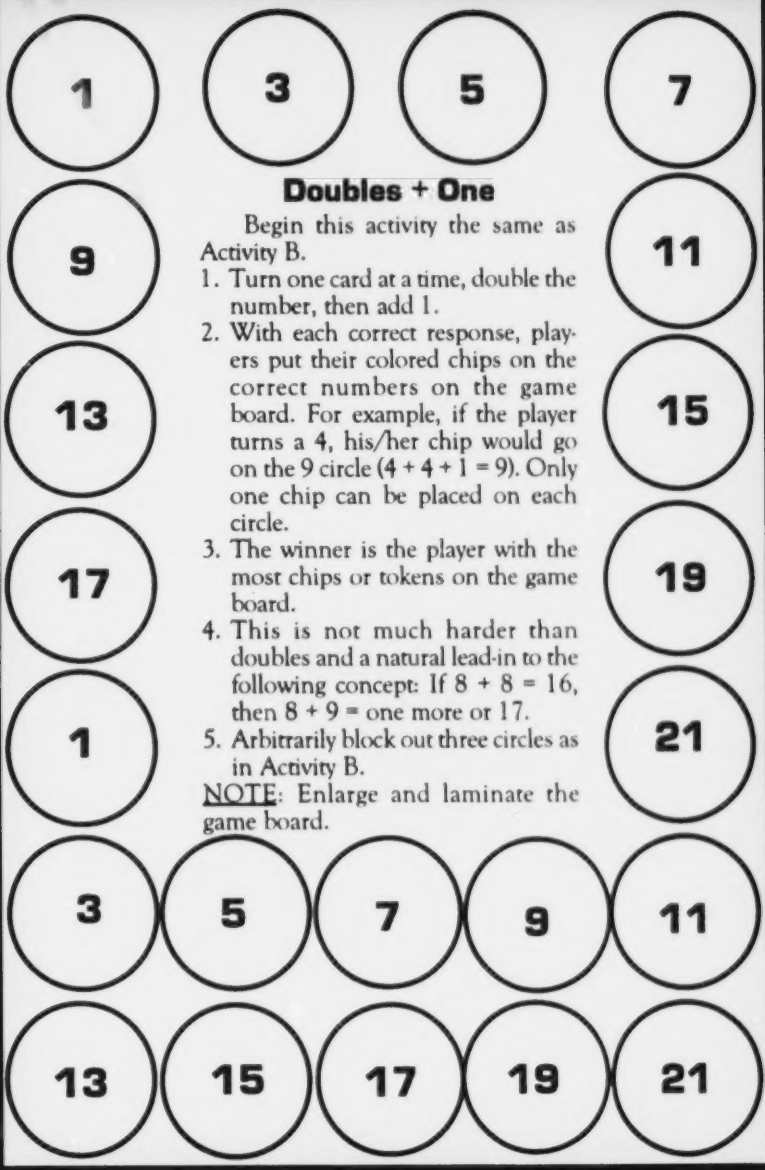
Doubles

This activity is done with two or more participants and is untimed. Use different colored chips or tokens for each player. Use red or black 0 through 10 cards (22 cards) which have been mixed by the learner.

1. Turn one card at a time and double the number as in Game Twelve.
2. With each correct response, players put their colored chips on the doubled numbers on the game board. For example, if the player turns a 4, his/her chip would go on the 8 circle (4 + 4 = 8).
3. Arbitrarily block out or cover three circles so the game does not end in a tie. Change with each game.
4. The winner is the player with the most chips or tokens on the game board.

NOTE: Enlarge the game board for ease of play, and laminate it for durability.

✷ ACTIVITY C ✷



Doubles + One

Begin this activity the same as Activity B.

1. Turn one card at a time, double the number, then add 1.
2. With each correct response, players put their colored chips on the correct numbers on the game board. For example, if the player turns a 4, his/her chip would go on the 9 circle (4 + 4 + 1 = 9). Only one chip can be placed on each circle.
3. The winner is the player with the most chips or tokens on the game board.
4. This is not much harder than doubles and a natural lead-in to the following concept: If 8 + 8 = 16, then 8 + 9 = one more or 17.
5. Arbitrarily block out three circles as in Activity B.

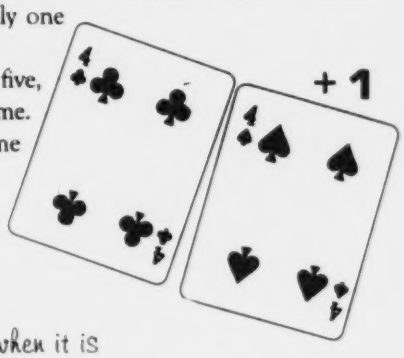
NOTE: Enlarge and laminate the game board.

GAME SIXTEEN

Doubles Plus 1

(timed)

1. Sort the 1-10 cards and 2 jokers into a deck (42 cards). The parent shuffles and deals out the cards one at a time as in Game Fifteen.
2. Conceptually, it is much more difficult for the learner to add 1 to each double. For example, the thought processing must be 4 + 4 = 8 plus 1 more = 9 when the 4 appears. Remember to display only one card to the learner.
3. It may be necessary to back off and allow five, six, or seven seconds when starting this game.
4. Follow the directions again as in Game Twelve.



To relax and wait for maturation when it is experience that is lacking would appear to be deliberately depriving the child of opportunities to learn.

Clay, 1991

The game of Doubles Plus 1 not only reinforces strict doubles but it also teaches the idea of 1 more and the difference of 1 (see Game Twenty). The concept of difference to teach subtraction is seldom taught in schools, causing students to count on their fingers. Although it is not wrong to count on the fingers, it is like having always to use paper and pencil in later grades to come up with answers. Developing thinking skills and resultant strategies are the objectives developed with these games. Teachers are aware of the problem of rote learning, but little is being done differently to change the system.

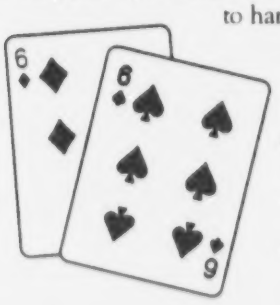
BEST COPY AVAILABLE

GAME SEVENTEEN

Doubles Plus 2

(timed)

1. Follow the directions in Game Sixteen, but adding 2 instead of 1.
2. Stepping up another notch, it becomes more of a short-term memory problem to hang onto the concept of 2 more. For example, 6 + 6 = 12 + 2 more = 14 when the 6 is played.
3. The learner must remember his doubles and count on 2 more in his head.
4. The game is played the same as Game Sixteen.



GAME EIGHTEEN

Doubles Plus 3

(timed)

1. Follow the same format as in Games Sixteen and Seventeen, but add 3 more.
2. This is a real mind bender unless the learner is given considerable time to respond. If you think about it, the response asked for is 3 plus any doubles up to 20. (Delay this game until later if it becomes frustrating.)

It is not necessary or even advisable to achieve mastery (two- to three-second response) at this point, but what is important is developing the concepts of 3 more and difference of 3. It would be reinforcing to spend time before Game Eighteen counting cards by 3 to 21. The parent does this by dealing three cards at a time or counting toothpicks (or anything else) in seven groups of three.

To go beyond to doubles plus 4 is really too difficult and serves no future purpose.

GAME NINETEEN

Sums to 10

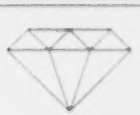
(timed)

1. Sort the joker (0), ace (1), 2, 3, 4, and 5 cards into a deck (22 cards), and spread them out face down on the table or floor.
2. The parent and learner draw one card at the same time and lay them face up on opposite sides of the spread.
3. The object is to practice adding random pairs of numbers as quickly as possible. Most combinations will be doubles (0 + 0, 1 + 1, etc.), one more (2 + 3, 3 + 4, 4 + 5, etc.), two more (2 + 4, 3 + 5, 4 + 6, etc.), and three more (1 + 4, 2 + 5, etc.). With the smaller numbers, the learner can add up more easily than with larger combinations.

4. Begin with five or six seconds. Keep each game close by controlling the time. The learner keeps the cards which he/she correctly adds within the determined time. Those incorrectly added go in the parent's deck.
5. At the end of the game, estimate who has the most cards in his/her stack.
6. Count by 2s, 3s, 4s or even 5s (teaching multiples/multiplication).
7. Score rounds to five or more for a game. Try to stay within 15 minutes for a game. Let the learner keep the score.

The whole idea behind teaching doubles, plus 1, plus 2, and plus 3 is to help the learner transfer this concept to aid in addition. Some learners may use doubles plus 1, 2, or 3 more as a strategy. Example: When the problem is 4 + 5, then if 4 + 4 is 8, 4 + 5 is one more, which is how many? Ask this question frequently to establish a mind set. This may sound a bit redundant, but most children struggle with simple addition having learned no strategy except finger counting.

At this point, try to jump ahead to The Ellerby Game 1, 2, 3 on page 53. You will be fascinated by the challenges presented!



The parent will continuously be motivated by assessing the learner's ongoing progress.

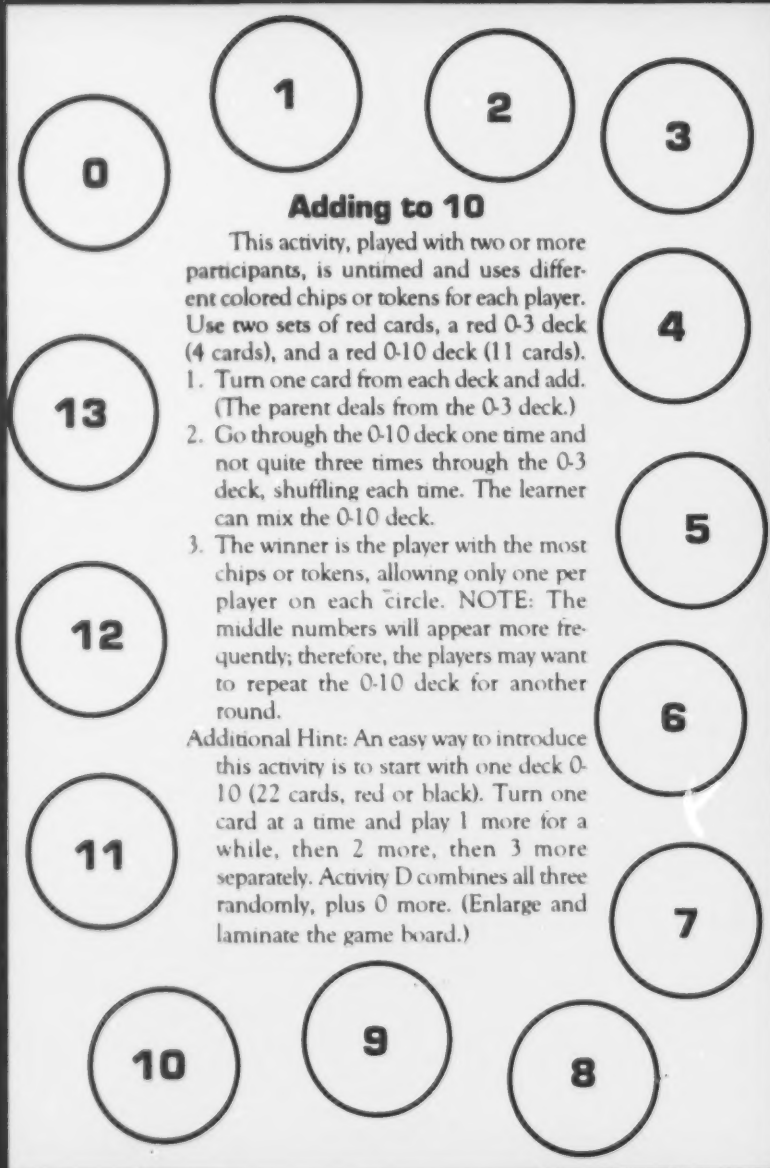
BEST COPY AVAILABLE

IMPORTANT! *When finger counting (adding), nearly all children will count through both numbers disregarding that one may be larger than the other. Each of these solutions is a strategy that we developed (usually by ourselves) early, and they are difficult to change. Spend time with five different children, and you may see five completely different ways to solve problems. Finger counting is the least desirable of these. An attempt should be made to build relationships and make comparisons which lead to the transfer of skills.*

REMINDER: Children should be taught to begin with the larger number, for example 5 + 3, by covering the 5 card with their hand and saying 5, then counting 3 more by touching and counting each shape on the 3 card,. This is called counting on, as has been discussed previously.

The concept 5 + 3 = 3 + 5 is even more difficult and not worth the effort to sort out at this time. This will be an "ah-ha!" with continued practice. Sometimes rather than diving right into a game, it helps to preteach strategies. Because the constant emphasis is on timed accuracy, the learner will opt for the quicker strategy; in this case doubles, plus 1, plus 2, and plus 3. This will make more sense to the parent when one of the most difficult problems, 8 + 5, is solved in two seconds. If you think how you might solve this problem, you may say any of the following: a) I just know 8 + 5 = 13; b) 8 + 7 = 15 take away 2 is 13; c) 8 + 5 is the same as 7 + 6 which is 13; d) 8 + 5 is the same as 5 + 5 plus 3 which is 13. Do you put the larger number first in your mind when adding? or the smaller? or does it make any difference to you? Think what your own strategies are. Are they efficient?

✷ ACTIVITY D ✷



Adding to 10

This activity, played with two or more participants, is untimed and uses different colored chips or tokens for each player. Use two sets of red cards, a red 0-3 deck (4 cards), and a red 0-10 deck (11 cards).

1. Turn one card from each deck and add. (The parent deals from the 0-3 deck.)
2. Go through the 0-10 deck one time and not quite three times through the 0-3 deck, shuffling each time. The learner can mix the 0-10 deck.
3. The winner is the player with the most chips or tokens, allowing only one per player on each circle. NOTE: The middle numbers will appear more frequently; therefore, the players may want to repeat the 0-10 deck for another round.

Additional Hint: An easy way to introduce this activity is to start with one deck 0-10 (22 cards, red or black). Turn one card at a time and play 1 more for a while, then 2 more, then 3 more separately. Activity D combines all three randomly, plus 0 more. (Enlarge and laminate the game board.)

Read This Before You Continue . . .

The upcoming games of "differences" should be preceded by considerable practice. The parent, looking at the deck of 42 cards face up, sorts through the deck displaying cards with a difference of 1, i.e., 2 and 3, 4 and 5, and even 6 and 7. Ask the question, "What is the difference between 4 and 5?" The learner will probably answer "Five is 1 more," which is correct. Try random differences of 2 more; 3 more will be harder, but the strategy will be planted. Expect the difference between 0 and any number to be learned quickly.

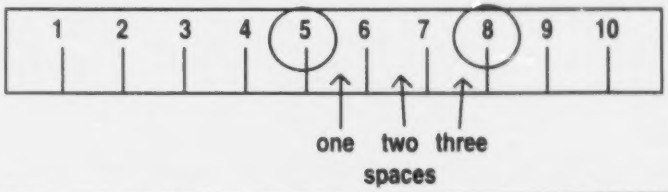
You may think it is easier and more efficient to count backwards for the problem 5 - 1 = 4 or 5 - 2 = 3. This is true, albeit confusing for the learner at this point. Just know that understanding when to add up or count backwards will unfold with time.

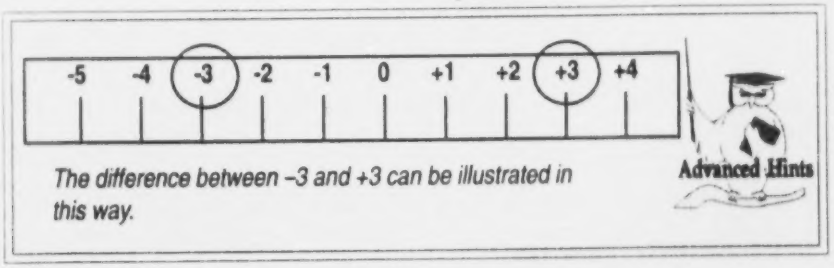
Counting backwards should be done by placing the learner's hand on the big card, say the number, then count back by touching the shapes on the smaller card.

Start playing and see what happens!

Use a Number Line

As a supportive means to teach differences (subtraction), start with a number line from 0 to 10. Have the learner show you the difference between any two numbers. For example, place a colored, transparent chip over the numbers 5 and 8 and count the spaces in between. This will give you the difference. Count up from the smaller number if the difference is less than 3; count backward from the larger number of the difference is 4 or more. Notice that both methods will yield the correct response. The number line is a valuable resource. It is easy to illustrate the difference between negative 3 and positive 3 = 6 (see Advanced Hint below), although not appropriate at this time.





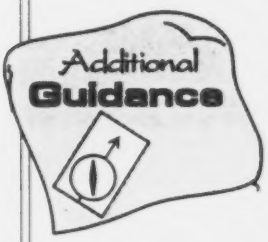
The difference between –3 and +3 can be illustrated in this way.

GAME TWENTY

Differences to 5

(timed)

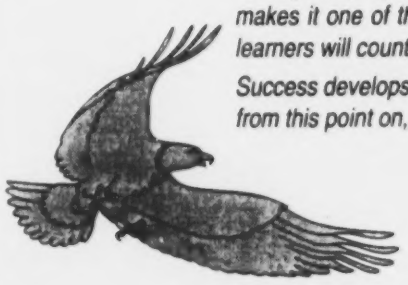
1. Use the same 0, 1, 2, 3, 4, and 5 cards as in the last game, and spread them similarly on the floor or table.
2. The learner draws one card and lays it face up on her side of the spread. The parent then draws one and lays it beside the learner's card. At first you may want to play this game untimed. To make the game more difficult, lay the cards on the opposite side of the spread.
3. The object is to determine the difference (subtraction) between your two cards.
4. Follow directions 4-7 in Game Nineteen. (See page 36 for a reinforcing activity.)



It will be apparent that having taught the concepts 1 more, 2 more, and 3 more, the learner will transfer to this game quickly. The writer has always thought that schools do not teach subtraction the easy way. By definition, subtraction means take away, which means starting with the larger number and counting backwards. ***It should be taught by adding up from the small number****, which is exactly what has been taught in Game Nineteen. The difference is in the word difference, which implies a separate mind set or strategy.*

Think ahead for a minute to an extremely difficult subtraction for first graders, such as 9 - 8 = 1 (Game Twenty-Two). By adding up, the difference is one, which makes it one of the easiest problems to solve. Some learners will count on no matter what the difference.

Success develops self-confidence and motivation, and from this point on, the learner will sprout wings and fly.



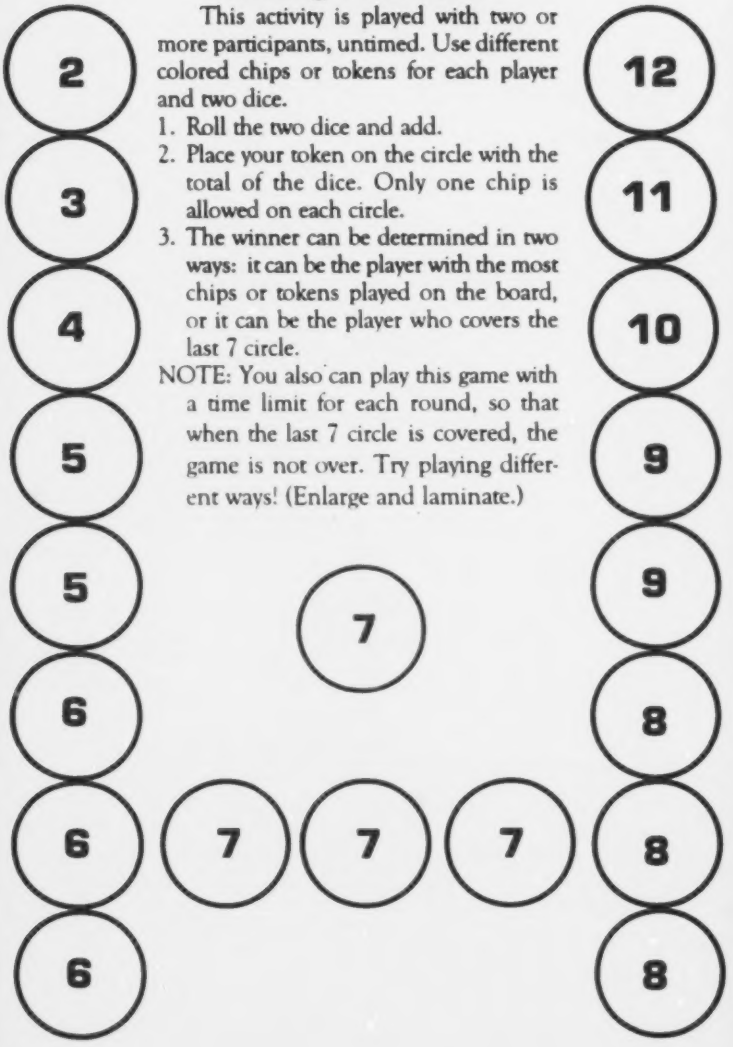
✶ ACTIVITY E ✶

Adding With Dice

This activity is played with two or more participants, untimed. Use different colored chips or tokens for each player and two dice.

1. Roll the two dice and add.
2. Place your token on the circle with the total of the dice. Only one chip is allowed on each circle.
3. The winner can be determined in two ways: it can be the player with the most chips or tokens played on the board, or it can be the player who covers the last 7 circle.

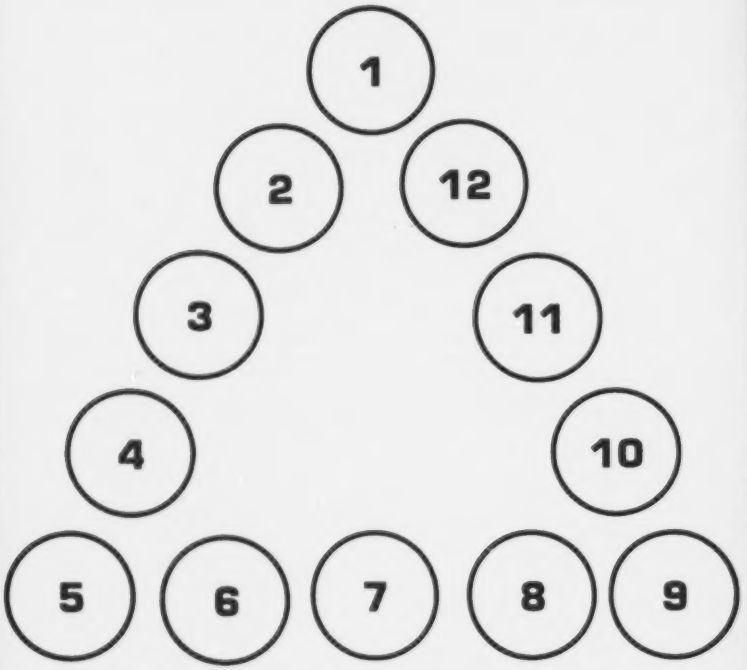
NOTE: You also can play this game with a time limit for each round, so that when the last 7 circle is covered, the game is not over. Try playing different ways! (Enlarge and laminate.)



BEST COPY AVAILABLE

✷ ACTIVITY F ✷

Add or Find the Difference With Dice



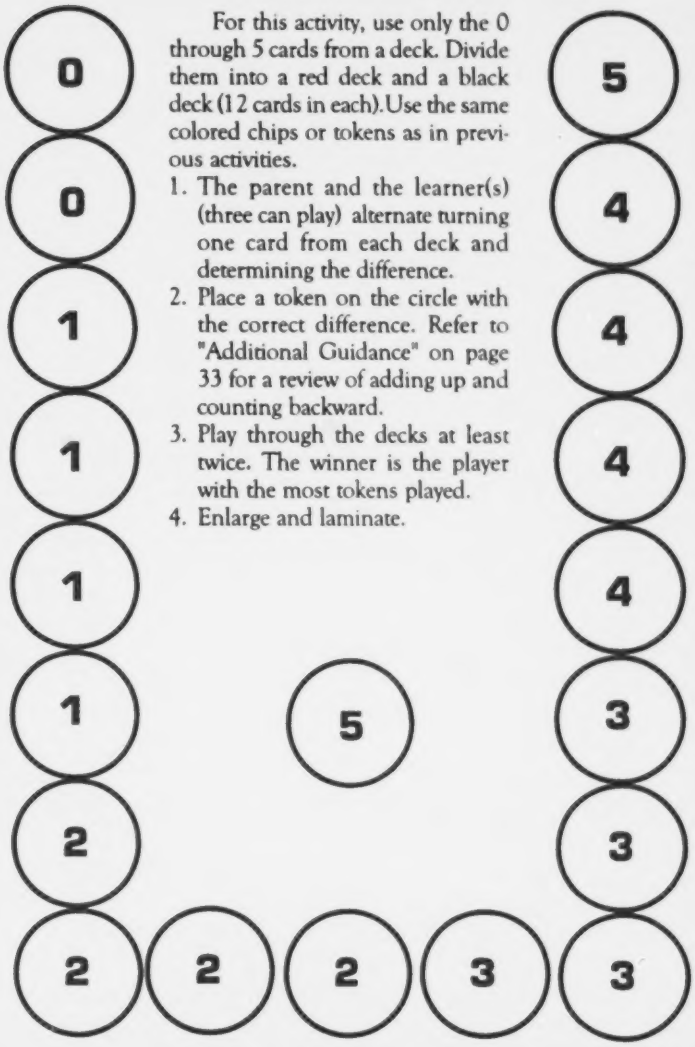
This activity is played with two or more participants, untimed. Use different colored chips or tokens for each player and two dice.

1. Roll the two dice and add OR subtract–player's choice.
2. Place your token on the circle with the total of the dice. Example: Roll a 6 and a 5, place your chip on either the 11 circle (6 + 5) or the 1 circle (6 – 5). Remember, the difference between 5 and 6 is 1. Subtraction means counting backwards, which may be difficult. Only one chip is allowed on each circle.
3. The winner can be determined in three ways: It can be the player with the most chips or tokens played, the player who covers the last circle, or ended by a time limit.

NOTE: You can also play this game with a time limit for each round, so that when the last circle is covered the game is not over. Enlarge and laminate.

✷ ACTIVITY G ✷

Determine the Difference With Cards



For this activity, use only the 0 through 5 cards from a deck. Divide them into a red deck and a black deck (12 cards in each). Use the same colored chips or tokens as in previous activities.

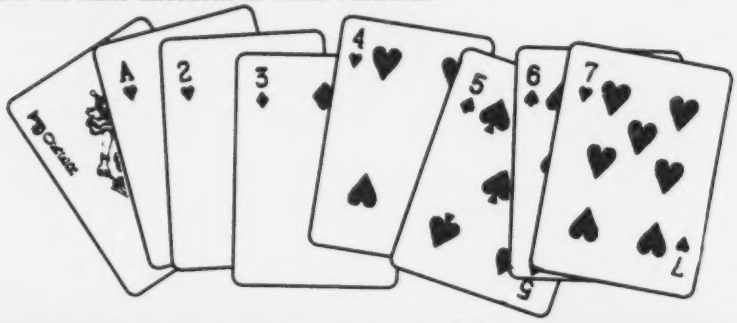
1. The parent and the learner(s) (three can play) alternate turning one card from each deck and determining the difference.
2. Place a token on the circle with the correct difference. Refer to "Additional Guidance" on page 33 for a review of adding up and counting backward.
3. Play through the decks at least twice. The winner is the player with the most tokens played.
4. Enlarge and laminate.

GAME TWENTY-ONE

Sums to 14

(timed)

1. Use the 0 through 7 cards.
2. Follow the same directions as Game Nineteen.



GAME TWENTY-TWO

Differences to 7

(timed)

1. Use the 0 through 7 cards as above.
2. Follow the same directions as Game Twenty.

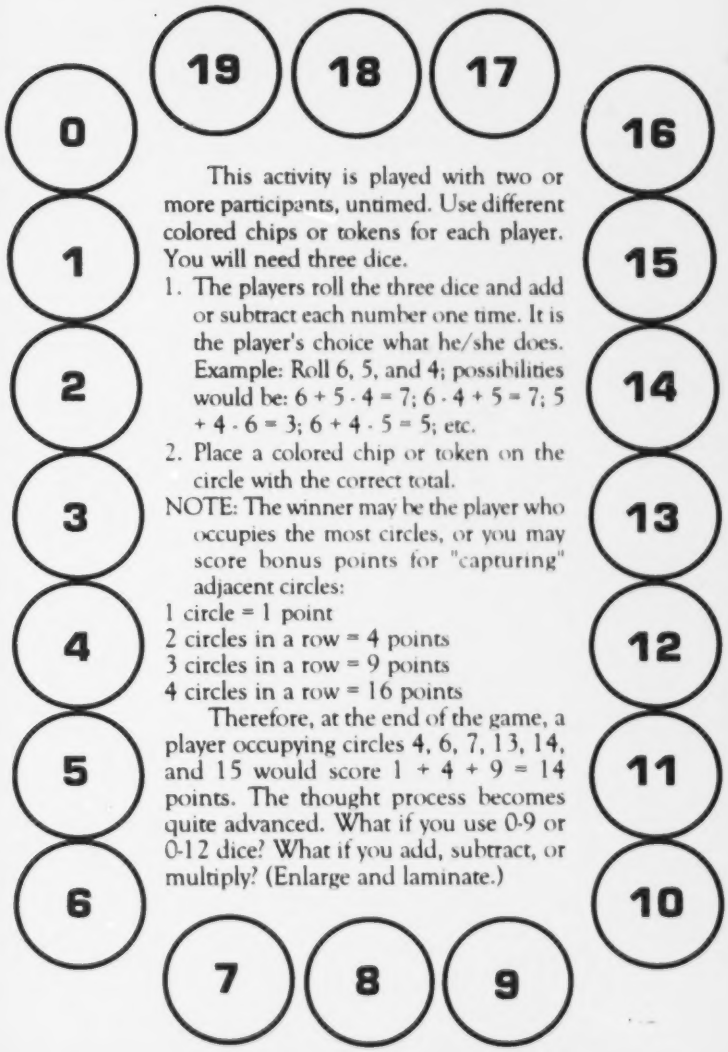
Reinforce doubles, plus 1, plus 2, plus 3, and differences in the above two games. The concept of ten (the next major hurdle) is now taking form. For example, 3 + 7 = 10; 6 + 4 = 10; 5 + 5 = 10. Considerable time will be devoted to this later in Game Twenty-Six.

The idea of interspersing these games is that one should be taught as reinforcing the other. The sum of 7 + 4 can be taught as double 4 plus 3 more, but it may be easier for the learner to visualize it as 7 + 3 = 10, and 1 more = 11.

The difference of 7 - 4 also is difficult because of the separation of 3. It may be taught by counting backwards beginning at 7. Fortunately, some learners will still continue to count up, such as 4 and 3 more is 7.

✷ ACTIVITY H ✷

Add or Subtract Three Dice



This activity is played with two or more participants, untimed. Use different colored chips or tokens for each player. You will need three dice.

1. The players roll the three dice and add or subtract each number one time. It is the player's choice what he/she does. Example: Roll 6, 5, and 4; possibilities would be: 6 + 5 - 4 = 7; 6 - 4 + 5 = 7; 5 + 4 - 6 = 3; 6 + 4 - 5 = 5; etc.
2. Place a colored chip or token on the circle with the correct total.

NOTE: The winner may be the player who occupies the most circles, or you may score bonus points for "capturing" adjacent circles:

1 circle = 1 point
2 circles in a row = 4 points
3 circles in a row = 9 points
4 circles in a row = 16 points

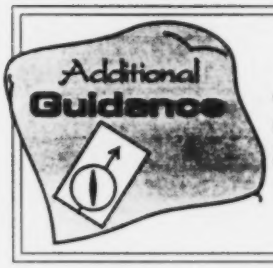
Therefore, at the end of the game, a player occupying circles 4, 6, 7, 13, 14, and 15 would score 1 + 4 + 9 = 14 points. The thought process becomes quite advanced. What if you use 0-9 or 0-12 dice? What if you add, subtract, or multiply? (Enlarge and laminate.)

GAME TWENTY-THREE

Sums to 20

(timed)

1. Use all of the numbered cards and 2 jokers (42 in all).
2. Follow the same directions as Game Nineteen.



Just to change the format, the parent may choose to deal out one card to each player or draw from a deck instead of picking from a spread deck.

GAME TWENTY-FOUR

Differences to 10

(timed)

1. Use all of the numbered cards again.
2. Follow the same directions as Game Twenty.

Summary/Review

This is a good time to review doubles, plus 1, plus 2, and plus 3. Example: plus 1 (4 + 5, 5 + 6, 6 + 7, 7 + 8, 8 + 9, 9 + 10); plus 2 (4 + 6, 5 + 7, 6 + 8, 7 + 9, 8 + 10); and plus 3 (4 + 7, 5 + 8, 6 + 9, 7 + 10). Holding the deck, the parent selects random combinations of plus1, plus 2, and plus 3. See how quickly the learner is able to shift from one to the other. The problems 8 + 10 and 7 + 10, etc., will be more easily taught in Game Twenty-Five.

BEST COPY AVAILABLE

MOST IMPORTANT SKILL:

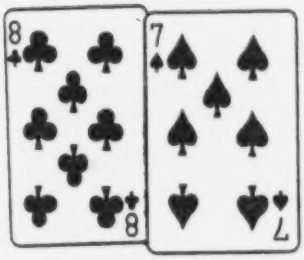
Differences, such as 10 - 9, 9 - 8, 8 - 7, 7 - 6, 6 - 5, 10 - 8, 9 - 7, 8 - 6, 7 - 5, and 10 - 7, 9 - 6, 8 - 5, 7 - 4, will be picked up quickly by adding up. The biggest concerns are 9 - 5 and 9 - 4. Even if the learner knows that 4 + 5 = 9, it usually takes practice by counting on cards backwards or using other manipulatives to master. Use the number line on page 32 if necessary. By this time the learner may surprise you.

GAME TWENTY-FIVE

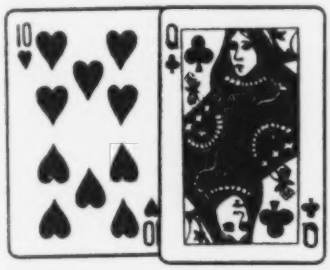
Combinations to 20

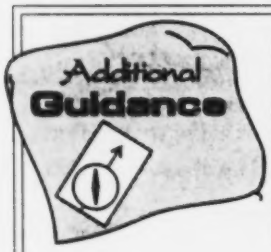
(untimed)

1. Use the entire deck, including the face cards and two jokers (54 cards).
2. Assign a value of 10 to the face cards (king, queen, jack). All other cards are worth their face values.
3. The parent, as dealer, deals two cards to the learner and two to himself/herself. The cards should be reasonably close but not touching The learner determines the sum for both players' cards.
3. Whoever has the greatest (highest) sum wins. Reverse after a while and allow the least (lowest) sum to win. Keep the cards you have won in a separate pile.
4. The winner is the player with the most cards. Several rounds may constitute a game.



Which sum is greater?





By assigning a value of 10 to the face cards and using them in this game, the opportunity to add 10 to any number is increased. This also establishes the value of face cards in the eventual games of "21" and "31." The learner not only must learn to add her own cards, but must add the opposing player's cards and make a comparison as to which is larger.

Notice that this game actually reviews many games previously taught and creates risk-taking (quick response).

IMPORTANT SKILL:

When each player gets an identical card, the learner will learn to cancel these cards and simply determine who has the largest of the two remaining cards. *Spend some time establishing this high-level skill. Example: When 5 + 8 and 4 + 8 are played, the 8s cancel each other, and the 5 is greater than the 4. It is not necessary to add in this case.*

As long ago as 1913, psychologist Edward Thorndike wrote that natural competition improves the motivation to learn; that direct rivalry with others is healthy.

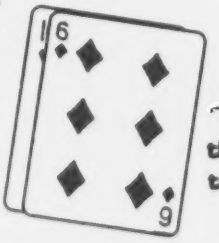
Playing Doubles with the tutor.

GAME TWENTY-SIX

Any Number Plus 10, 20, 30, 40

(untimed)

1. Use four 10s and one set of 0-9 cards (14 cards in all). The object is to add 10 to each number.
2. Lay down a 10, then, one at a time, lay down a 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 beside the 10 in that order. The learner should add the two, giving the correct response after each card is played. Example: 10 + 1 = 11; 10 + 2 = 12; 10 + 3 = 13; etc.
3. Usually this strategy is picked up rapidly as the learner sees it is only necessary to add the number followed by the word "teen." Example: 14 = 4 + teen, 18 = 8 + teen. However, 11, 12, and 13 will be more difficult to teach, because they do not follow the above system.
4. Now lay down two 10s, followed by 0, 1, 2 , 3, 4, 5, 6, 7, 8, and 9 in that order. Ask for a quick response.



Hint: Cover the zero to make 16

5. Remember, what's actually being taught is the sum of 20 and any other number to 10. For example, 20 + 6 = 26, 20 + 8 = 28, 20 + 10 = 30.
6. Continue with three 10s to 39 and four 10s to 49. It is not possible to go to 50 with one deck as it contains only four 10s.

After adding with one 10, two 10s, three 10s and four 10s several times as above, it is then advisable to mix and match (by sorting through the deck) with different combinations of 10s and units, for example 10 + 8 = 18, 10 + 10 + 10 + 6 = 36, 10 + 10 + 9 = 29, etc. It is surprising how fast learners pick up this seemingly difficult concept.

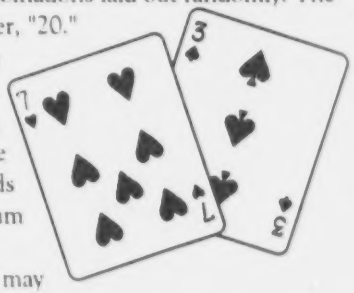
Advanced Hints

GAME TWENTY-SEVEN

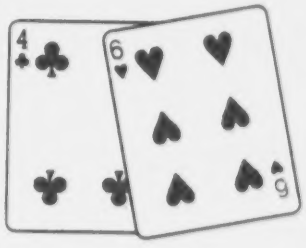
Combinations of 10

(untimed)

1. Use one set of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 cards (11 in all).
2. Lay out the cards, facing the learner, in pairs with sums to 10; 10 + 0 = 10, 9 + 1 = 10, 8 + 2 = 10, 7 + 3 = 10, 6 + 4 = 10, and 5 + 5 = 10.
3. Again, none of these sums are new information; yet it may be difficult at first for the learner to see the connection that all cards in a deck have a match of which the sum is 10.
4. Assemble different combinations of 10s unknown to the learner. Each combination of two cards will be referred to as a "set of 10." Example: One set of 10 may be 8 + 2 or 9 + 1; two sets of 10 may be 7 + 3 and 5 + 5, or 6 + 4 and 10 + 0; three sets of 10 may be 9 + 1, 8 + 2 and 5 + 5, or 6 + 4, 7 + 3 and 10 + 0.
5. Beginning with one set of ten, turn the two cards over and ask the learner to identify the sum. This is nothing but review; however, the awareness of combinations of 10 is the objective.
6. Using two sets of 10, turn over different combinations laid out randomly. The learner will match each set and say the answer, "20."
7. Play again as above,but throw in a "fooler" such as 8 + 2, 9 + 1, and 9 = 10 + 10 ÷ 9 = 29. Repeat with all different combinations of sets and foolers. Ask what is missing to make another 10? Example: 7 + 3, 6 + 4, and 5 (needs another 5 to make 30). What would the sum be?



8. Three sets of 10, even four and five sets of 10 may be randomly displayed, matched, and an answer determined within eight or ten seconds by the learner, throwing in a fooler now and then.
9. If the above is handled easily, two foolers with a sum less than 10 can be added to the game as an extra challenge; for example, 5 + 5, 10 + 0, 6 + 4, and 3 and 2 = 35. Further, 8 + 2, 7 + 3, 5 + 6 = 31, when randomly displayed, is even a greater stretch.



Demonstrate the functionality of math in everyday life.

MOST IMPORTANT SKILL:

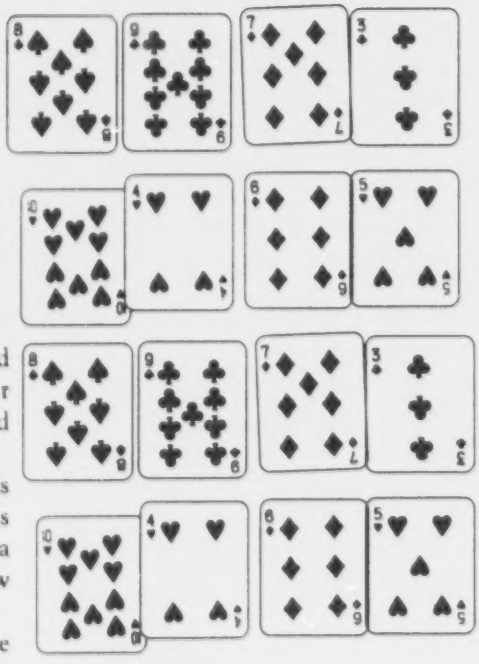
The parent controls Game Twenty-Seven by selecting the various sets depending upon the learner's ability to respond. Take your time. Considerable concepts are covered in this game.

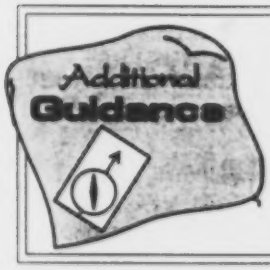
GAME TWENTY-EIGHT

Matching 10s

(untimed)

1. Sort the 1-10 cards into a deck. You should have 40 cards.
2. Lay out the cards in a four-by-four pattern (four rows with four cards in each). There will be 16 cards showing face up.
3. Allow the learner to go first. Have him/her pick out each set of two cards totaling 10 and put them in his personal pile. The 10 card will not need a match unless you use the jokers, in which case the 10 and joker (0) would be a set. For example, the learner will see and remove 6 and 4, 3 and 7, etc.
4. The parent, as dealer, will deal cards into the spaces left by the cards removed. The dealer then gets a turn at picking out the new combinations of ten.
5. The game continues until all the cards have been matched into sets of 10.
6. The winner is the person with the most cards. You may want to count by 3s in preparation for triples in an upcoming game.





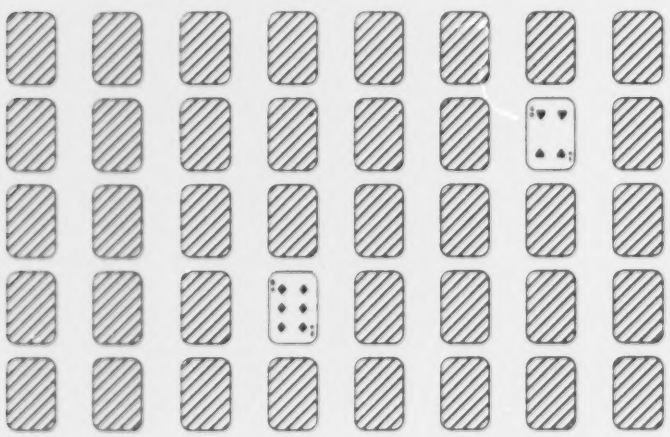
In Game Twenty-Eight and Twenty-Nine rather than counting individual cards to determine the winner, add up the 10s in each hand to see who has the highest sum. Remember, the total of all cards is 220.

GAME TWENTY-NINE

Concentration with 10s

(untimed)

1. Using the same 40 cards as in Game Twenty-Eight, lay all cards on the table or floor (I like to play on the carpet) face down in rows and columns.
2. The first player turns up two cards. If the two card's total is 10, it is a match, and the player keeps those two cards in a personal pile. If the cards do not match, they are turned face down again, then it is the next player's turn.
3. The game is over when all cards have been matched. Count by 10s to see who is the winner.



GAME THIRTY

Combinations of 10 to 100

(untimed)

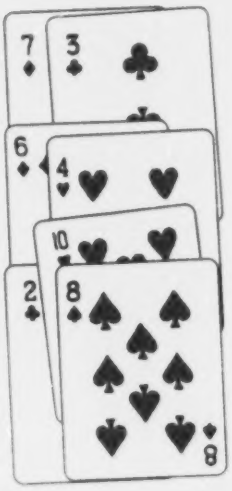
1. Sort the 1-10 cards into a deck. You will have 40 cards again.
2. The parent sorts through the cards face up in his/her palm and picks out sets of 10, laying them one card at a time in a horizontal row in front of the learner.
3. By working toward 100 by 10s and units in rapid fashion, the learner will become at ease and familiar with any combination of 10s to 100. A verbal response by the learner (shown in parenthesis) is given after each card is added. Example: Begin with 10, turn up a 1, learner says (11); turn up a 9, learner says (20); + 10 (30), + 8 (38), + 2 (40), + 7 (47), + 3 (50), + 10 (60), + 5 (65), + 5 (70), + 6 (76), + 4 (80), + 10 (90), + 1 (91), + 9 (100). Reversing the above by removing the cards singly in sequence is a much more difficult task. Two at a time (a set of 10) will be easier. Actually, the learner is counting backwards from 100 to 0.
4. With many learners, it may be advisable to begin this game by going forward and reverse to and from 40, then gradually extend to and from 50, 60, etc., gradually to and from 100.
5. The advanced form of this game is to subtract cards one at a time out of sequence. Taking away a set of 10 and 1 unit of the next set at one time may pose a problem for the majority of learners. Try it, but don't ever frustrate the learner.

This book is the best investment you will ever make
. . . 200 hours of family togetherness
for less than 10 cents per hour!

GAME THIRTY-ONE

Add a Deck of Cards

(timed)



1. The coup de grace of Games Twenty-Six and Twenty-Seven is being able to add the entire deck using combinations of 10 in less than three minutes. This can be taught easily to many kindergartners and most first graders.
2. If the joker (0) is used, it will be necessary to borrow two more from another deck so you have four jokers in all. It works just as well using the 40 number cards with the 10 having no partner (or match).
3. Randomly spread the deck face up on the floor in a tightly clustered, circular pattern.
4. The learner will begin at zero seconds by selecting a 10 or sets of 10 and laying it with one-half overlap in a vertical column adjacent to the spread deck. The tendency will be to hurry and mess up the vertical stack but don't allow this.
5. Seldom, if ever, will learners start with all the 10s then move to 9s + 1s, 8s + 2s, etc. It is best not to tell them this, because for some the search slows them down. Only a dominant left-brained child will nurse a penchant for doing this, and children generally do not function this way. Isn't it wonderful?
6. Continue to stack each set of 10 in a vertical column adding up to 100. Count by 10s to check. Start a second stack to 100 next to the first column. The four remaining cards should form two sets of 10, making the total 220. Check the time. The learner will be highly motivated to beat his/her own best time or show off to friends, company, and relatives.
7. An advanced form of this game is to take out one, two, or three cards before spreading the deck, then ask the learner to determine which card or cards are missing and what the new total is. Of course, the cards held out should not be a set of 10.

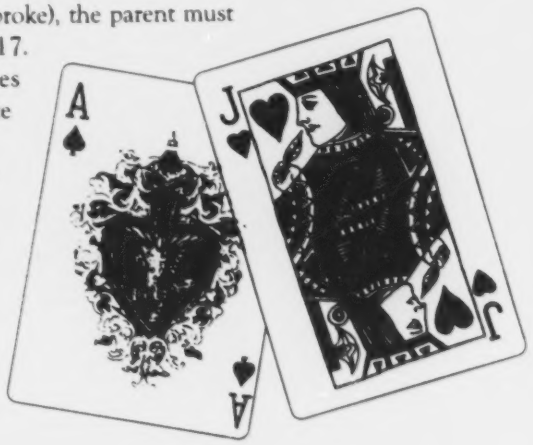
The writer has experimented every year with sixth graders to see how quickly they can add a deck of cards given no advance strategies. Only 3 to 5 percent will think of a strategy other than adding cards consecutively the way they have been taught for five years. There is truth that any concept can be taught at any level (age) if the instruction is meaningful and appropriate. How many adults believe this? Try this one. Add the numbers zero to 100 in less than three minutes. There is a strategy. The answer will be found later, so don't lose any sleep. Example: 100 + 99 + 98 + 97 . . .

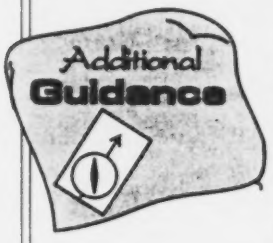
GAME THIRTY-TWO

"21"

(untimed)

1. Use the entire deck of 52 cards (no jokers).
2. Give each player five white poker chips to begin the game.
3. The parent begins by dealing each player two cards face up. The object is to get close to 21 in face value of the cards, the face cards counting 10, the ace counting either 1 or 11, and all other cards counting as their face value.
4. Ask the learner if he/she wants another card. Remember, the total cannot exceed 21.
5. If the learner goes over 21 (broke), the parent must draw if the count is less than 17. This is not Las Vegas rules which favor the house. Chance should prevail.
6. Whoever gets the highest point count without going over 21 receives a chip from the loser. The game is over when one player is out of chips. The other player has then won.



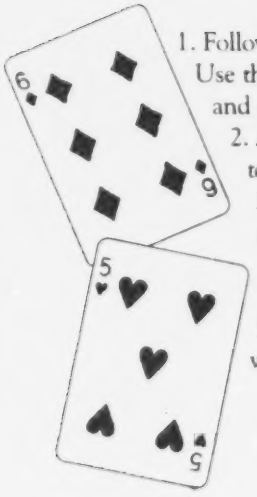


Eventually the game of 21 can be played with one of the two cards face down, but initially it may be necessary to help the learner think through the correct response by reviewing strategies. This game teaches estimating (about how many do I have?), uses all the games previously taught, employs risk-taking, and develops the high-level thinking skill involving a missing addend. Example: If the learner has a 10 and a 6, what is needed to make 21? This is a very difficult concept to teach, and the parent must occasionally ask the question. Keep stretching but don't overdo it. It's fun to see how much thinking revolves around the ace (1 or 11). Remember, 11 is 10 and 1 more. In Game Thirty-Four and Game Forty-Nine, when we teach the values of chips, the learner will be able to decide how much to bet.

GAME THIRTY-THREE

Matching 11s

(untimed)



1. Follow the same format as Game Twenty-Eight (Matching 10s). Use the 1-10 cards (40 cards) and lay 16 cards face up in rows and columns.
2. Allow the learner to go first and pick out each set of cards totaling 11.
3. Each card will have a match; 10 + 1, 9 + 2, 8 + 3, 7 + 4 and 5 + 6.
4. The blank spaces, where matches have been made and cards removed, are filled with new cards.
5. Each player takes a turn until all cards are matched. The winner of the round is the person with the most cards.

Winning all the time diminishes the competitive spirit.

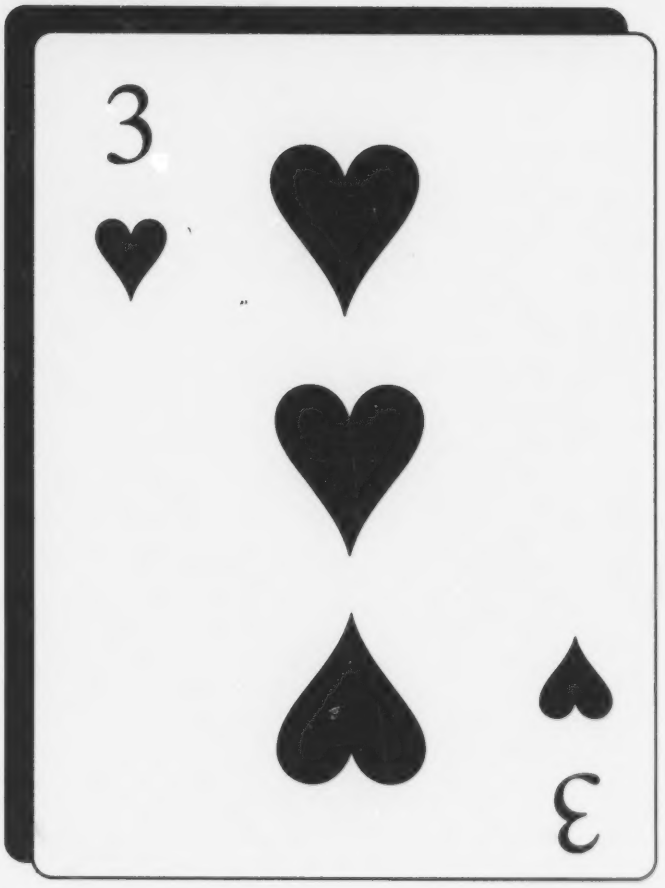
Another spin-off of Game Thirty-Three is to add up the 11s to see who has the highest sum. This is not an easy task. The confusion may result, because you have taught 11 is 10 and 1 more. Now you are adding different sets of 11 (9 + 2, 8 + 3, etc.). Eventually the learner will pick up counting by 11s; 11, 22, 33, 44, 55, 66, 77, 88, 99, but don't dwell on this. Yes, it's also possible to treat each set of 11 as 10 + 1, count 10s and 1s separately, and determine the sum.

Advanced Hints

To predict a learner's growth, neither I.Q., knowledge base, nor ability to learn new procedures are as important as the ability to flexibly apply skills to solve novel problems. —Campione and Brown, 1990

Sorting cards is tough.

PART



64

Read This Before You Proceed

Congratulations for perservering with the sequence of games so far. If you are contemplating beginning here because your child is 5-1/2 to 6 years old, please consider this a mistake. Strategies developed in Part 2 are essential as are the concepts of "one more", "doubles", and "difference."

The games to come are as much fun for the family as they are for your child. A great stride toward future academic success has been secured at this point. It is important to intersperse math games with reading and maintain an active and interested role in your child's schooling. Your child's kindergarten teacher, no doubt, will see your child as very bright in mathematics, but it is up to you to keep working toward Game Sixty. It is possible to complete this book by age six, but don't push too hard.

It will be necessary to purchase a few more accessories for the upcoming games: red, blue, and white poker chips and double 12 dominoes.

Second graders learn with kindergartners.

BEST COPY AVAILABLE

GAME THIRTY-FOUR

The Ellerby Game 1, 2, 3

(untimed)

1. This game was one of the first games incorporated into the school kindergarten program, and my name was assigned by the teachers.
2. Remove the 7 through 10 cards and face cards from the deck. You will play the game with the ace (0) through 6 cards. You should have 26 cards.
3. Each player receives ten white poker chips, five red chips, and three blue chips; whites are worth one; reds, two; and blues, three.
4. Using a poker chip as a pattern, draw three circles on a sheet of paper. Color one red and one blue and leave one white. Label each color with the chip values listed above. This will act as a visual reference for the learner.
5. Lay the shuffled deck of cards face down. Each player draws one card on his/her turn.
6. The players must remove chips equal to the amount of the card drawn. Each should place the chips off to the side but not mix them with other players' chips as they will be used again. Example: If the 5 card is turned up, the learner may choose to remove a blue chip (3) and a red chip (2), a blue chip (3) and two white chips (1 each), five white chips, or two red chips (2 each) and one white chip (1).
7. The first player to run out of chips wins the round. Try three to five rounds to a game.
8. IMPORTANT: To advance this game, the draw card can be at face value (above); 1 More, 2 More, 3 More (Game Eleven); Doubles (Game Twelve); Sums to 10 (Game Nineteen); or Differences to 5 (Game Twenty). Adding these strategies makes The Ellerby Games (Thirty-Four, Thirty-Five and Thirty-Six) the most versatile and fun in this book.

Although the games herein are intended to be developmentally organized, chance learning may lead one learner to advanced insights, passing some steps other learners follow.

BEST COPY AVAILABLE

MOST IMPORTANT SKILL:

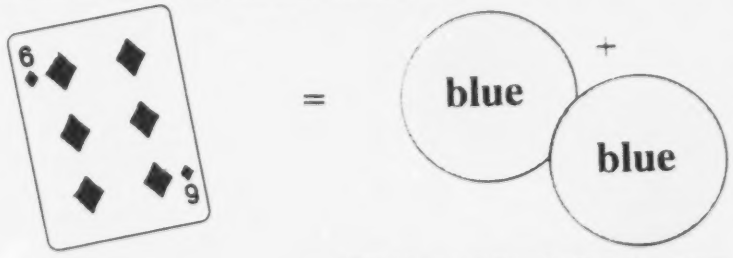
The concept of assigning a variable value to a single chip is the third most important skill taught. It may not be new to learners who have a knowledge of money. However, many children don't have this understanding. It usually is necessary to have the learner tap the center of the chip with his/her finger and count at the same time. Example: one blue (tap one, two, three) and one red (tap four, five) equals five. Always start with the largest chip when counting. It may be necessary to make change; for example, if a 2 comes up and the learner has only a blue chip (3), the blue must be exchanged for three whites (1 each) or one red (2) and one white (1), referred to as "making change." Try not to help too quickly. It is fun to watch the thought process given so many choices. Tapping and counting may not be necessary for very long. This game is a precursor to games using money, which are upcoming.

GAME THIRTY-FIVE

The Advanced Ellerby Game 1, 2, 3

(untimed)

1. Sort the 0-10 cards and two jokers into a deck for a total of 42 cards. It may be a big step to include the 7, 8, 9, and 10 cards all at once. Use your judgment.
2. Follow the same format as Game Thirty-Four, but it is advisable to use 15 white chips, 6 red chips, and 4 blue chips. Chip values remain the same: blue = 3, red = 2, white = 1. The amount of chips used may be adjusted to make the round longer or shorter. Adding more white chips means that it will not be necessary to make change as frequently. For an extra challenge, and to extend the game time, add gold chips and count them as 5.

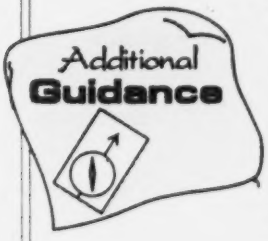


GAME THIRTY-SIX

The Reverse Ellerby Game 1, 2, 3

(untimed)

1. Use the 0, 1, 2, 3, 4, 5, and 6 cards (26) as in Game Thirty-Four.
2. In this game all chips are placed in a center pile easily accessible to all players.
3. Use 20 white chips, 11 red chips, and 6 blue chips. This totals 60 points.
4. Again, each player turns one card and removes that value of chip(s) from the center pile. When all the chips are removed, the winner of the round is the one with the highest sum of chips in his/her personal pile. Arrange the chips by color and tap when counting.



At first, the chips may be counted blue, red, and white in sequence; largest value to smallest value. Later they may be grouped by 5s and counted that way. For example, blue (3) + red (2) = 5, red (2) + red (2) + white (1) = 5. Counting by 5s is more difficult than counting by 10s. This is a good way to visualize the process. As a challenge, the parent arranges his 5s with the learner's 5s in a row and counts. Using all the chips, it is possible to count from 0 to 60. Remember to start with 0. Add the scores from each round on a score sheet. Separate the 10s from the 1s in two columns.

Dad				John			
30	+	3	= 33	20	+	7	= 27
20	+	9	= 29	30	+	1	= 31
50		12		50		8	

Adding only the 1s column is a fun way to score the game (to 25) so the learner can keep the total sheet. He/she also can add the 10s column, but it is likely the game to 80 or 100 would end up a tie. Try both ways but not at the same time.

The ability to change 1s to 10s and carry is a skill learned much later. It would be best not to confuse the learner by trying to explain it at this point.

One of the most difficult things to accomplish in counting by 5s is learning to start in the middle of a sequence and counting up. There is a certain flow if the learner begins at 0. If interrupted, the flow is broken, and usually the learner must go back to the beginning. Start at 20, 25, 30, etc. and have him/her count up to 60. This is a precursor for counting small change. It won't take long to get to 100 by 5s, especially if it is represented visually.

GAME THIRTY-SEVEN

I'm Thinking

(untimed)

This may not be exactly where Game Thirty-Seven fits into the developmental hierarchy, but this is as good a place as any. In a simpler form it could be used earlier.

In a typical math class problems must be copied from a book, and the learner is accountable to show his/her work. For the most part, this is not an exercise in computation but rather practice in small muscle control. As much as two-thirds of a student's time is spent in numerical penmanship. I have helped my grandson, Tyson, mentally work through an entire math chapter in 30 minutes. A week later he may have completed the assignments (the same problems) in individualized, self-paced math imposed by the teacher.

The object of this game is mental review, and the following are some not-so-simple mind benders requiring rapid thought processing. Use them at breakfast, on trips, or before bedtime. The possibilities are limitless. Make up your own.

Less Difficult

7 and 2 more
double 2 and 1 more
0 and 3 more
1 less than 3
double 4 and 2 more
double 1 plus 0
double 3 and 1 more
2 less than 3
4 and 3 more
double 2 and 4 more
double 4 plus double 1
double 2 less 1
double 2 plus 1 plus 0
double 4 take away 2
double 4 less 1 plus 1
double 1 plus double 0
double 4 minus 1
double 3 plus 0
double 0 plus 1 plus 2
double double 2
double 1 plus double 1 plus 2
double 2 plus double 1
double 3 take away 1
double 5 minus 1
double 0 plus 2 plus 2
double 5 take away 9
1 plus 2 plus 3
0 plus double 2 plus double 0
3 less than 4 plus 1

More Difficult

4 plus 5 plus 6 (ask how)
23 take away 3
5 plus 5 plus 5 plus 2
3 sixes
7 plus 1 take away 6
4 fours
3 fours take away 1
double 4 plus 6
3 fives plus 4
double 3 plus double 4
double 5 minus 4
the difference between 25 and 27
double 10 take away 19
triple 5 take away 10
triple 10 take away 28
triple 2 plus double 3 plus 1
triple 4 take away 3
13 minus 6 plus 6
15 take away 11 and 1 more
the difference between 10 and 15
double 10 plus double 8
double double 10 minus double 10
triple 8 minus double 2
triple 5 plus triple 5

Hey, Mr. Ellerby! This is fun!

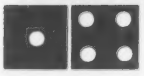
Too often math instruction emphasizes rote learning and number recipes over reasoning. For many learners, math is a mysterious, meaningless, abstract activity with little relevance to daily life. —Bruer, 1993

GAME THIRTY-EIGHT

Double 9 Dominoes and Dice

(untimed)

1. For this game you will need a box of double 12 dominoes, a pair of dice (1-6) and a 12-inch ruler. Take out all the 10, 11, and 12 dominoes so you end up with a set of double 9s. The higher numbered dominoes will be used later.
2. Lay the ruler between the two players. From a separate pile (kitty), turn all the dominoes upside down. Each player draws seven dominoes and turns them right side up on his/her side of the ruler.
3. To begin the game, each player selects one of her seven dominoes and lays one end touching the 0 end of the ruler. Any number from blank to 9 may be showing.
4. Roll the dice to see who goes first. The highest dice rolled starts the game.
5. On each roll, the sum on the dice must be equal to the sum of the back of the leading domino and the front half of the trailing domino that is played. Example: If the leading domino number is 5 and the sum of the two dice is 9, then a 4 domino must be played adjacent to the 5 (for a total of 9).
6. If the dice are thrown and no play can be made, a domino is drawn from the kitty. This domino can be played immediately if possible.
7. The first player to reach the end of the ruler gets 12 points (1 for each inch). The other player gets the point value on the ruler where the front of his/her leading domino is. (Most dominoes are two inches long.)
8. The first player to get 40 or 50 points wins the game. It should be possible for the learner to total the score after each round. Rounds and games usually will be close and exciting.



BEST COPY AVAILABLE

Since you have purchased double 9 dominoes (or double 12 dominoes), you might as well play the games as designed. However, it is not necessary to add . . . just match. Matching has great value for the quick visual recognition of various patterns of dots. Except for the 9, the dots on dominoes and shapes on cards nearly correspond. Do not count from top to bottom and left to right any more. Practice three rows of 3 (9), three rows of 4 (12), two rows of 3 and 2 more (8), two rows of 4 and 3 more (11), etc.

Using the ruler in this game is a simple way to establish the concept of inch and foot (12 inches). Talk about it. Measure objects around the room. Make a picture of the object and label its approximate length (height) and width. Using blank sheets of paper, have the learner trace around the ruler and cut various lengths with scissors.

It may be necessary for the parent to assist in adding and making comparisons. This is no easy task. Older siblings should be encouraged to enter in and play.

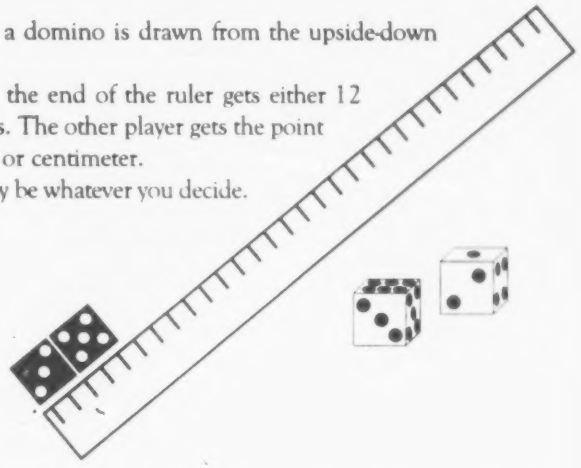
The foundation of success is determined when the learner discovers his/her own particular competencies.

GAME THIRTY-NINE

Double 12 Dominoes and Dice

(untimed)

1. For this game you will need a box of double 12 dominoes, a pair of dice (1-6) and a combination 12-inch/30-cm ruler.
2. Follow rules 2 through 6 the same as Game Thirty-Eight.
3. Each player has the option of using either the sum of the two dice or double that amount. Example: If the back half of the leading domino is 12 and the sum of the two dice is 8 (16 if doubled), then a 4 domino can be played adjacent to the 12, totaling 16.
4. If no play can be made, a domino is drawn from the upside-down stack (kitty).
5. The first player to reach the end of the ruler gets either 12 (inches) or 30 (cm) points. The other player gets the point value to the nearest inch or centimeter.
6. The total game points may be whatever you decide.



The goal is less in winning than getting better.

GAME FORTY

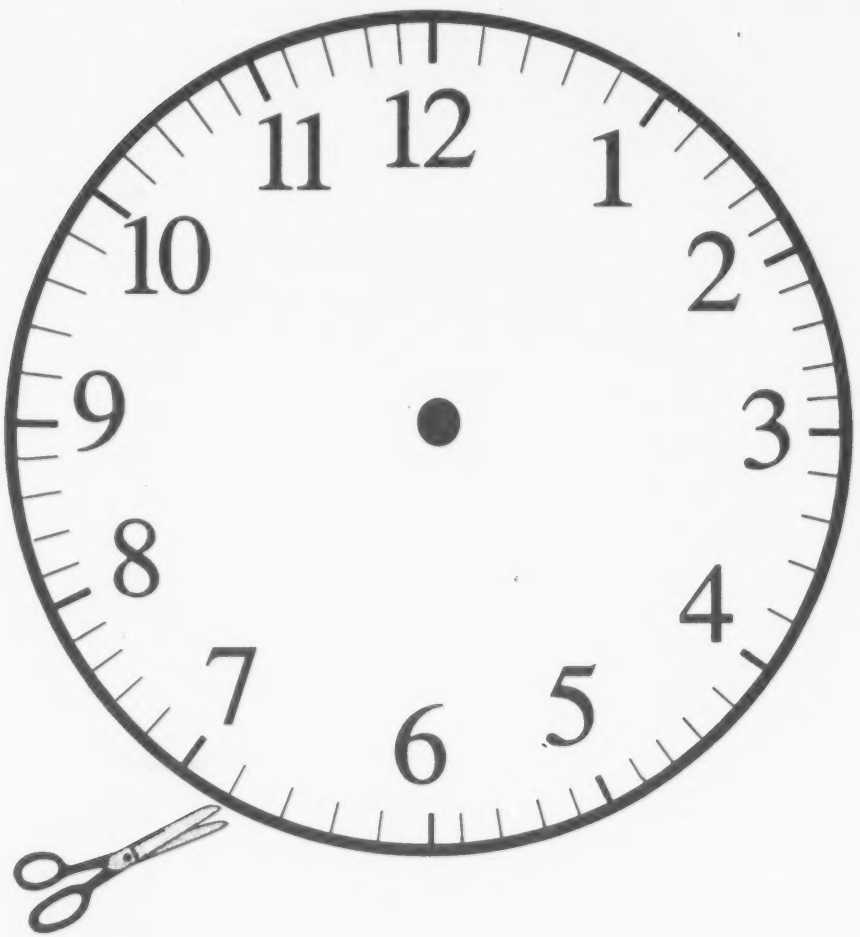
Telling Time to the Hour

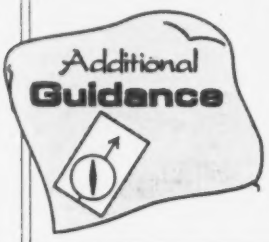
(timed)

1. Enlarge the clock face and hands on the following page. Glue them to a firm piece of tagboard/cardboard or laminate. Cut out the hands, and use a brad to secure the hands in the center of the clock. Place the hour hand on top of the minute hand.
2. Use the 1 through 10 cards and the jack (11) and queen (12). Have the learner mix the cards and place them face down in a pile next to the clock dial.
3. Allow an appropriate number of seconds (perhaps four or five seconds to begin)

for the learner to draw a card and locate the time to the hour on the clock dial.

4. For each correct response within the time period, the learner gets to keep the card. Proficiency will be determined when all 12cards are won in a reasonably short time span. The parent should earn points once in a while by controlling the time interval.





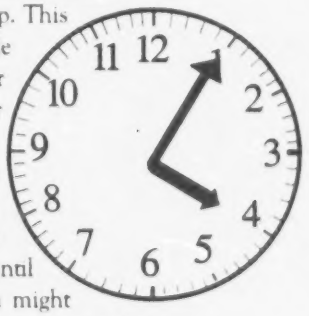
It will be necessary to teach the learner to hold the minute hand on 12 while moving the hour hand to the correct time. Alternate after each game having the learner count by 1s to 60 and by 5s to 60 (counting by 5s was introduced in Game Thirty-Six). The concept of 60 seconds in an hour is quite difficult and may not be easily learned for some time.

GAME FORTY-ONE

Telling Time to 5 Minutes

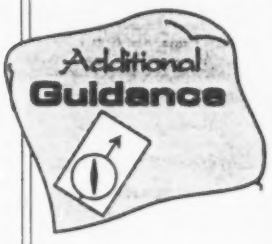
(timed)

1. Use the same clock dial as in the previous game.
2. You will need the 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 (jack), and 12 (queen) cards (one of each) in pile one (12 cards), and four more 5 and 10 cards (8 cards) from a different deck in pile two.
3. Mix the decks separately and place the two piles next to the clock dial in front of the learner.
4. The directions given to the learner by the parent will be to draw one card from pile one and one card from pile two. Each card on pile one should cover the card below so the hour will change, while each card in pile two will be played with a one-half overlap in a vertical column as in Game Thirty-One. This will facilitate adding by exposing all 5s and 10s as a reference.
5. This game may be played timed or untimed. If timed, begin the count after the cards have been turned face up. This way the learner must add the 5s and 10s in the pile two cumulatively, and then locate the correct hour and 5-minute designation within the given number of seconds.



6. A more advanced form of the game would be to turn a random number of cards, from 1 to 8, from pile two. In this case, pile two must be briefly mixed after each play. The game would continue until all 12 cards in pile one have been drawn. You might experiment with the time element by beginning to count when the last card in pile two has been turned. This may encourage the learner to subtotal as each card is turned, rather than totaling when all cards are face up. Naturally, it will be easier and faster the fewer cards are turned in pile two.

7. To keep score, 8 points will be scored if all hour and 5-minute designations are accomplished within the allotted time period for direction #5 and 12 points for direction #6. Those points not earned by the learner are assigned to the parent.



To begin with, it will be necessary for the learner to move the hour hand first and hold it in place directly opposite the correct hour before moving the minute hand. It is more important to learn the concept of 5-minute intervals than the correct placement of the hour hand someplace between hour markings on the clock face. As the learner moves the minute hand, he/she should hesitate and verbally count at each 5-minute interval. When he/she is able to do this successfully, then the correct location of the hour hand may be introduced.

Game Forty-One reinforces adding by 5s and 10s which is a reinforcement of Games Twenty-Six, Twenty-Seven, Thirty, and Thirty-One, and a prelude to Game Forty-Three.

Telling time to the nearest minute is easily learned after the concept of 5-minutes has been established. Practice on nondigital clocks/watches during different times of the day. Use a digital timepiece as a self-check.

Testaments to Needed Improvement:

Math scores, as reported by the National Assessment of Educational Progress, 1995, indicate that American students finished 14th out of 15 countries whose populations were comprehensively sampled.

The National Center for Educational Statistics, 1993b, found that only 30 percent of white United States eighth graders reached a math proficiency level.

BEST COPY AVAILABLE

GAME FORTY-TWO

Double Draw Difference

(timed)

1. Sort the 1-10 cards and 2 jokers into a deck (42 cards in all). The parent shuffles and spreads the cards face down.
2. Both the parent and the learner draw two cards simultaneously.
3. The object is for the learner to add both sets of cards on either side of the spread and determine the difference between the totals within an allotted time period. Example: The parent draws a 9 and a 5 (totaling 14) and the learner darws an 8 and a 2 (totaling 10). The difference is 4.
4. Frequently, the parent and learner will draw a card with a similar number. In this case, the cards will "cancel" each other, and the difference will be determined from the two unlike cards. Example: The parent draws a 6 and a 4 (10) while the learner draws a 7 and a 4 (11). The 4s cancel to 0, and the difference is determined using the 6 and the 7. Would you believe that learning to cancel is a precursor to algebra?
5. Since this game requires three sets of calculations, it may be necessary to allow six to seven seconds.
6. Cards are won when the difference is called out correctly by the learner in the allotted period of time. If the learner's response is not correct, the parent keeps the cards. The winner of the game is the player with the most cards. Estimate how many and count by 3s in preparation for triples (Game Forty-Five).
7. Keep the game close by adjusting the response time.

MOST IMPORTANT SKILL:

Remember, the term difference implies adding up versus subtraction, which is taking a smaller number from a larger number. Hopefully, the learner will continue to add up no matter what the difference. Teachers refer to this process as determining the missing addend, which we first introduced in Game 32. Example: 7 + 8 = 15, which is 8 more than 3 + 4 = 7; 9 + 8 = 17, which is 3 more than 7 + 7 = 14, and 8 + 8 = 16, which is 4 more than 6 + 6 = 12. It may be necessary to review the concepts of doubles plus 1, plus 2, and plus 3 to assist in adding. It also may be necessary to count backwards by touching each shape on the smaller set of cards. The learner has the option to use many different strategies in this game. It is important for the parent to ask how the problem was solved and reinforce strategies the learner uses effectively. We are attempting to achieve metacognition or thinking how to think. Some children will be able to move to a more advanced game of Triple Draw Difference, while others will struggle with Double Draw Difference.

BEST COPY AVAILABLE

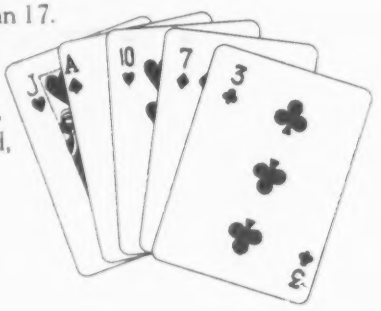
It was brought to my attention a while back by a second grader that the difference between a one-digit and a two-digit number can be simplified. His thought processing went this way: The problem was 13 - 9. He adds 1 to 9 to make 10; the difference between 10 and 13 is 3; therefore 3 + 1 = 4, which is the difference. He used the same logic when figuring 15 - 6; 6 + 4 = 10 and 10 + 5 = 15; therefore, the difference is 4 + 5 or 9. It's a great strategy to use in this game. Teach it and see if it catches!

GAME FORTY-THREE

"31"

(untimed)

1. Use a full deck (52 cards).
2. Whereas Game Thirty-Two ("21") did not utilize the concept of betting, it might be fun to allow the learner to become a serious risk taker in this game. Use 20 cents worth of white (1), red (2), and blue (3) chips as real money and either supplement or take away from the weekly allowance based on the learner's success. Be sure there is a payoff or there is no meaning and therefore, little motivation. Example: five whites (5¢) + three reds (6¢) + three blues (9¢) = 20¢.
3. Take turns being the dealer/banker.
4. To begin, deal two cards face up and one face down to each player.
5. Ask the learner if he/she wants another card with the goal being to reach but not exceed 31. The ace counts as either 1 or 11, face cards count 10, and all other cards count their face value.
6. Neither player signifies when he/she goes broke (exceeds 31).
7. The dealer must draw if the count is less than 17.
8. Since this is a game of chance, there is little opportunity for either player to lose much money. Later, after the Ellerby Game 1, 5, 10 (Game Forty-Nine) has been introduced, real money can be substituted for chips.



This may be one of the first opportunities for the learner to experience losing, but the stakes are relatively small, and it is a welcome to the real world. However, losing consistently can become discouraging . . . to either party. If concerned, play for fun or for an extra five minutes of TV time.

As you play, keep asking the learner how he/she arrived at the total. It may be necessary for the parent to turn all cards over and suggest different strategies for adding.

The Game of "31" is a precursor to the game of Cribbage which is one of the final games taught in this book.

Advanced Hints

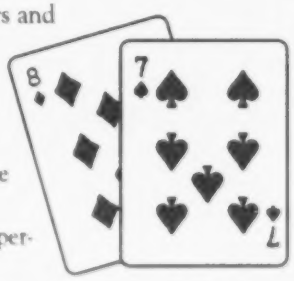
Counting cards by two at a time.

GAME FORTY-FOUR

Sums to 40

(timed)

1. Sort the two jokers (0) and cards 1-10 into a deck (42 cards). Lay the deck face down on the table or floor.
2. The parent and/or learner will draw two cards from the top of the deck and turn them over side by side adjacent to the deck.
3. The object of the game is to add the two numbers and double this sum as quickly as possible. Example: 7 + 8 = 15, double 15 = 30; 9 + 10 = 19, double 19 = 38. (Omitting the larger cards makes the game easier.)
4. Begin with seven or eight seconds. Keep the game close by controlling the time.
5. Whoever wins keeps the two cards in his/her personal stack.
6. Estimate who has the most in his/her stack.
7. Count by 3s, because we are soon going to work on triples.
8. Score rounds to five or more for a game. Let the learner keep the score.



Doubled = 30

Instead of drawing two cards from an upside-down deck, you may choose to each draw a card simultaneously from a spread deck as a variation. This game is simply an advanced form of Game Twenty-Three, Sums to 20. For those sums over 20, this is an excellent time to think through new strategies and review the old ones. For example, if a 9 and a 10 turn up, the process could be 9 + 9 = 18 plus 10 + 10 = 20 and 20 + 18 = 38 or 9 + 9 is the same as 8 + 10 plus 10 + 10; therefore, 10 + 10 + 10 + 8 = 38 or 9 doubled = 18 and 10 doubled = 20 and the sum is 38 or 9 + 10 = 19 and 19 doubled = 38. If there are other possibilities, the learner may find them, but it is important to identify the metacognitive process (thinking how to think) with the learner.

BEST COPY AVAILABLE

Game Forty-Four can be made more challenging by playing double the sum of two cards plus 1, plus 2, or even plus 3. Example of plus 1: 7 + 8 = 15, 15 doubled = 30, plus 1 = 31. I played this game with my two grandchildren, ages 7 and 11, together with the eighth grader next door for about 30 minutes. Guess who was tough? You're right, the 7-year-old, because we had been practicing how to think! I must confess that my 11-year-old grandson, Tyson, has regressed somewhat since I quit working with him four years ago. Regardless, he still loves me, and this is partly because of the many hours we played together.

Advanced Hints

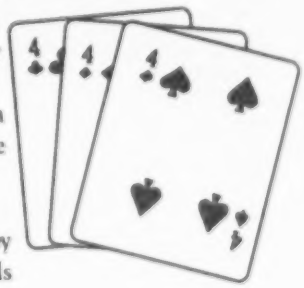
Math is not like riding a bike—it can be forgotten. Once mastered does not mean forever retained.

GAME FORTY-FIVE

Triples

(timed)

1. Organize the 0-10 cards into a deck of 42 cards, or start with 0-5 (22 cards) adding the 6, 7, 8, 9, and 10 cards to the deck one at a time as the learner progresses.
2. Lay sets of three cards on the table and teach the concept of triples: three 0s, three 1s = 3, three 2s = 6, three 3s = 9, three 4s = 12 and three 5s = 15. Stop at this point, or proceed with triple 7, 8, 9, and 10 depending on the stage of readiness of the learner.
3. Having counted by 3s in previous games, the learner should have some of the triples mastered already.
4. Lay down the cards one at a time beginning with a five- or six-second interval. The object is to reduce the response time to one or two seconds.
5. The winner puts the card in her personal stack.
6. Continue to determine the winner of each round by counting by 3s. Keep score to five or more rounds per game.



The writer has reservations about teaching 3s multiplication facts, but there are relevant applications for this in future games. Learning 4s and beyond should wait until third grade (8 years old). It's amazing how much emphasis there is in the public school system for learning times tables. It is the most unthinking activity that takes place and signifies for many students a downhill plunge into paper and pencil derivations with no meaning attached. It's no wonder kids can't problem solve nowadays.

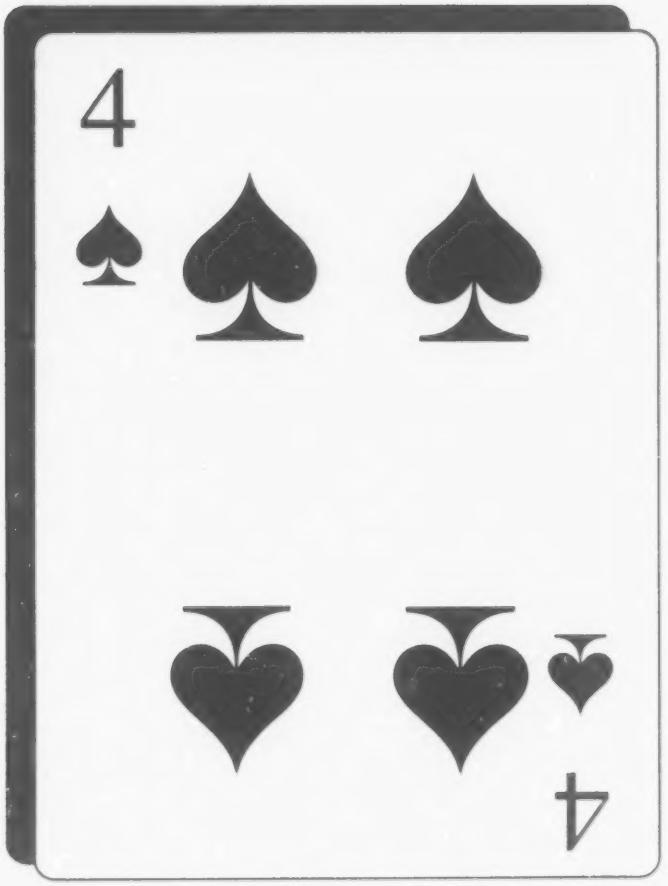
As with the games of doubles (Games Seventeen, Eighteen, and Nineteen), it is fun to add triples plus 1, triples plus 2, and triples plus 3 to create thinking situations purposefully. This also slows down the learner's response time and allows mom or dad the chance to win once in a while. Be careful, or the learner will outpace the teacher (parent) and for sure older brothers and sisters. Involve them too . . . or embarrass them.

How are we doing?

Remember to intersperse reading time equally with math time. Teaching the learner to read is much more difficult. Perhaps I will write another book on reading. Maybe this is better left to the responsibility of the first-grade teacher. Quality time together is the highest priority right now.

Zach has a great self concept.

PART

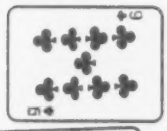


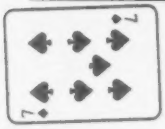
For Ages 6-7

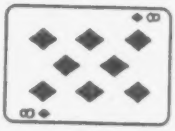
GAME FORTY-SIX

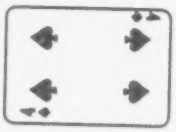
Four-Card Addition

(timed)

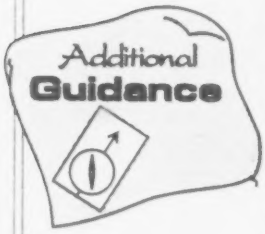








1. Use the same deck as in Game Forty-Five. Spread the cards evenly in a line between the parent and the learner.
2. Each player draws two cards at the same time and lays them face up on either side of the spread.
3. The object of the game is to add all FOUR cards together as quickly as possible.
4. Establish an appropriate number of seconds to allow the learner to win most of the time. The winner keeps all four cards.
5. Follow the last three rules of Game Forty-Four for scoring and rounds played.



Game Forty-Six is an advanced form of Game Twenty-Five and somewhat harder than Game Forty-Four. The learner must now add the possibility of four different numbers in no certain sequence. In a normal classroom setting few, if any, students will look for combinations or consider any strategy other than adding each card to the next in random order. Example: 9 + 6 + 10 + 4 would be 9 + 6 = 15, 15 + 10 = 25, 25 + 4 = 29. By regrouping you would have 10 + (6 + 4) + 9 = 29. Another example: 8 + 8 + 7 + 7 could be determined by a) 8 + 7 = 15 plus 8 + 7 = 15 (using doubles plus one) and 15 + 15 = 10 + 10 + (5 + 5) = 30 or b) 8 + 8 = 16 plus 7 + 7 = 14 (using doubles) and 16 + 14 = 10 + 10 + (6 + 4) = 30 or c) 8 + 8 + (7 + 1) + 6 (using triples) = 24 + 6, which is the same as 20 + (4 + 6) = 30.

✷ ACTIVITY 1 ✷

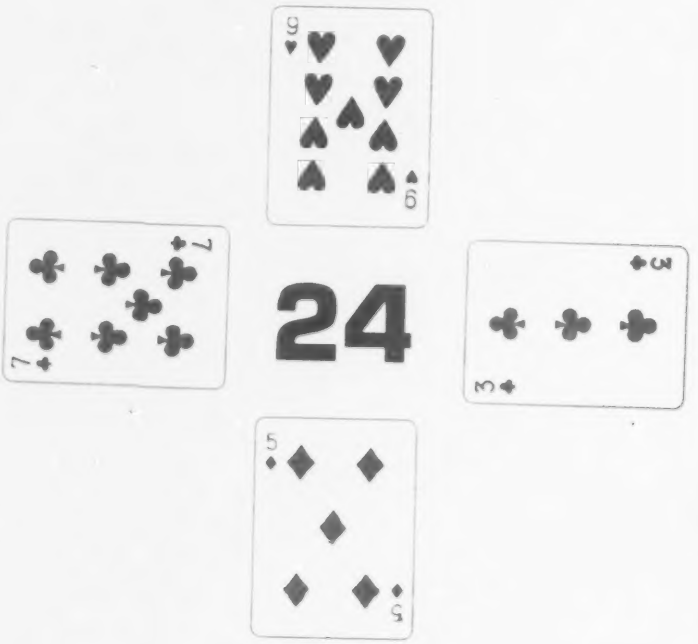
Combinations to 24

Use a deck of cards without the face cards (40 cards). Ask the learner to place one card in each of the four positions shown below to show a sum of 24. See how many different combinations of 24 the learner can get by trial and error before giving assistance.

Write them down for 10¢ each.

For a greater challenge, ask the learner to add three of the numbers and subtract one for a total of 24. You'll find the answers on page 93.

For adult engineers, this variation is a special challenge: Using 7, 7, 3, and 3, how would these numbers need to be combined to give a total of 24. Don't peek until you've tried!



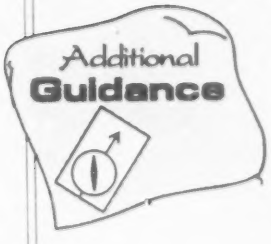
There are many ways to derive a solution. One is not necessarily better than another. By this time the parent should have determined if the learner has preferential strategies. Do not teach all options, but simply ask the question, "How did you do this?" If there is no consistency, it's even better, because different strategies have been assimilated by the learner.

GAME FORTY-SEVEN

Three-Card Combinations

(untimed)

1. This is a fun exercise to reinforce the previous game.
2. The parent controls this game using the 1-10 cards.
3. Look through the deck, and sort out (one set at a time) three cards in sequence to lay on the table in front of the learner.
4. The object is for the learner to add these sequenced cards using triples. Example: 5 + 6 + 7 equals the same as 6 + 6 + 6 (triple 6) = 18. Borrow 1 from the 7 and give it to the 5 making them both 6s.
5. Other examples are: 3 + 4 + 5 is the same as 4 + 4 + 4 (triple 4) = 12; 6 + 7 + 8 is the same as 7 + 7 + 7 (triple 7) = 21; 7 + 8 + 9 is the same as 8 + 8 + 8 (triple 8) = 24; and 8 + 9 + 10 is the same as 9 + 9 + 9 (triple 9) = 27.



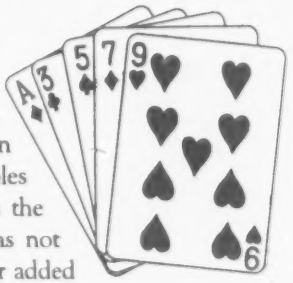
Of course, there also are numerous sets of three cards that would reinforce triples plus one and triples plus 2. Example: 4 + 4 + 5, 5 + 5 + 6, 6 + 6 + 7, etc. (triples plus 1) and 4 + 4 + 6, 5 + 5 + 7, etc. (triples plus 2). Most learners can handle these combinations in stride, so they may be added to the exercise in this order. Eventually the three options—triples, triples plus 1, and triples plus 2—can be mixed up and presented to the learner. Triples plus 3 may or may not make sense. Try it! Example: 4 + 4 + 7, 5 + 5 + 8 (probably solved 10 + 8), 6 + 6 + 9 and 7 + 7 + 10 (probably solved 14 + 10).

BEST COPY AVAILABLE

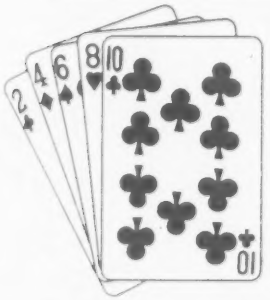
GAME FORTY-EIGHT

Odd and Even

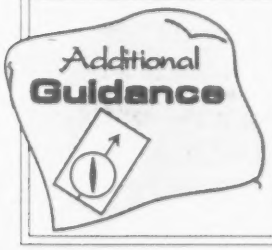
(timed or untimed)



1. Use only cards 1-10. Eliminate the jokers (0) and face cards. You will have 40 cards.
2. Sorting through the deck, pick out numbers that represent even (2, 4, 6, 8, 10) and discuss that even numbers are produced by counting by 2s or multiples of 2. Introduce multiple at this point, which is the same as doubles or 2x. No doubt the learner has not associated doubles with 2x, but rather the number added to itself.



3. Sort through the deck and pick out the odd cards (1, 3, 5, 7, 9).
4. Play one card at a time from a shuffled deck (timed) and watch how quickly the learner picks up the concept of odd or even when one card at a time is displayed.
5. When the response time is one- or two-seconds, introduce two-card odd or even played randomly. Only initially is it logical to determine the sum, because the object is not to derive a sum, but rather to understand that even plus even is even (4 + 6 = 10), odd plus odd is even (3 + 7 = 10), and even plus odd is odd (4 + 7 = 11). Play the game with the learner until a one- or two-second response time is achieved.
6. It is easy to see how this game expands to three-card, four-card, five-card, and six-card odd or even. The learner will begin to keep track of a running odd or even "total" rather than waiting until the last card in the sequence is played. The answer will be nearly immediate as the final card is turned; therefore, it makes no sense to play under timed conditions.



The writer got the idea for this game from a high school instructor who complained that many of his students did not grasp the idea of odd and even. Given the thinking ability developed by the previous games, it is only a small challenge for most 6- to 7-year olds to understand this concept.

The parent, incredulous that all this is happening, is just as motivated as the learner by the results of practice and patience. It's no wonder good teachers love their jobs.

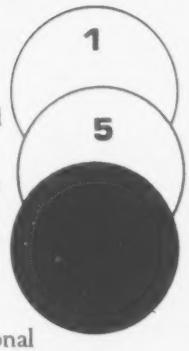
Although it doesn't make much sense, the writer's grandson, Cody, (at age 7) tracked the entire deck given about a one second interval to process. From Game Thirty-One: Add a Deck of Cards, he remembered the total is 220, which is even, because half the deck is even and half the deck is odd. Wow!

Advanced Hints

GAME FORTY-NINE

The Ellerby Game 1, 5, 10

(untimed)



1. Use the 0-10 cards (42 cards).
2. Each player receives ten white poker chips (worth 1 each), six red chips (worth 5 each) and four blue chips (worth 10 each).
3. Using a poker chip, draw around it and make three circles on a sheet of white paper. Leave the white as white and color in red and blue. Label each with its respective value of 1, 5, and 10. Some learners may not require this visual reference.
4. Lay the deck face down and each player draws one card in turn.
5. A chip(s) equal to the value of the card turned is put in a personal pile. If a 10 turns up, the learner may choose to remove a blue (10) chip, two red (5) chips, or one red and five white (1) chips.
6. The first player to run out of chips wins the round. Try three to five rounds to a game.
7. The game can be played as doubles plus 1, doubles plus 2, and doubles plus 3 as well. Each card drawn can represent one of the above, which speeds up and complicates the game considerably. Examples of doubles plus 1 would be: If an 8 is drawn, double 8 = 16, plus 1 = 17. One blue (10) chip, one red (5) chip, and two white (1) chips can be discarded. Of course, you can think of numerous other options. Add two more red chips and two more blue chips to each player to increase the length of each round. The game can be made easier by adding more white (1) chips, because it is not necessary to make change so often.
8. Using the same format, each player can draw two, three, or four cards and remove the chips equivalent to the sum.

MOST IMPORTANT SKILL!

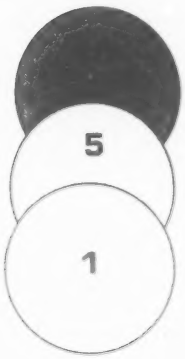
After playing The Ellerby Games for a while with chips, real coins should be substituted so the learner can begin to learn the concept of money and making change. Watch how fast the transfer from white, red, and blue chips to pennies, nickels, and dimes takes place. Be sure to refer to the coins by their names, as above.

GAME FIFTY

The Reverse Ellerby Game 1, 5, 10

(untimed)

1. Use the same deck as in Game Forty-Nine with 42 cards.
2. Instead of giving each player his/her own chips, all are placed into an easily accessible center pile.
3. Begin with the same total number of chips as in Game Forty-Nine: 20 white (1) chips, 12 red (5) chips, and 8 blue (10) chips for a sum total of 160.



4. Turn one or more cards at a time and remove that value of chip(s) from the center pile.
5. When all chips are removed, the winner of the round is the one with the highest sum. More than two players can participate.
6. The object of the game is for the learner (modeled by the parent) to stack continuously his/her chips in quantities of ten, so they may be quickly and efficiently counted to determine the winner.
7. The first player to get to an even number of points, say 300, is the winner of the game.
8. The learner may be able to add consecutive scores. For example 87 plus 64 would be 80 + 60 = 140 and 7 + 4 = 11, which is 140 + (10 + 1) = 151. If not, the parent should explain this process. Refrain from adding by carrying 1s to the 10s column (typical rote math). Once this algorithm is taught the learner stops thinking, and it's all downhill.

As in Game Forty-Nine, Game Fifty can be expedited and complicated by doubles; doubles plus 1, 2, or 3, double draw and triple draw. Whereas Game Forty-Nine teaches values and making change, Game Fifty also teaches counting money by 10s. Even before real coins are substituted for chips as in Game Forty-Nine, the concept of 100 chips equals $1 can be illustrated. By adding more real pennies, nickels, and dimes to the pile, the learner can count 100 pennies, 20 nickels, and 10 dimes to 100. Trade him/her for a dollar bill each time to show the relationship.

Advanced Hints

GAME FIFTY-ONE

Big Bucks

(untimed)

1. Enter the real world. Because it is hard to get to high enough numbers using cards without resorting to multiplication, another more meaningful system needs to be substituted.
2. Using common food items, toys, or anything of personal interest to the learner, it is fun to begin to buy and sell (play store) up to values of about $15. Because of the bar-coding system in many stores, prices may have to be approximated and marked on the items by the parent.
3. Introduce the concept of a quarter (difficult), and allow the learner to manipulate coins and bills in multiple combinations. For example, a box of Ralston Cookie Crisp cereal costs $3.29: a) the learner gives you three dollars, three dimes, and the change is one cent; b) the learner gives you three dollars, a quarter, and four pennies; c) the learner gives you a five dollar bill and you return one dollar, two quarters, two dimes, and a penny, etc.
4. Start a piggy bank. Give out an allowance using change. Shop together and count pocket money. Take every opportunity to allow the learner hands-on experiences with money.

✷ ACTIVITY J ✷

Pick Pocket

Directions: Enlarge and laminate the game board below. Put five dimes, nickels, and pennies in an old shirt or pants pocket, and ask the learner to draw out a few (four or five at first). Without showing the coins, the parent tells the learner the sum and number of coins. The example shown is 38¢ with 8 coins. Five different trials are demonstrated–until the correct coin combination is determined.

Objective: The learner, by trial and error, tries to place __ coins with a sum of __ in the proper boxes. If the learner gets the right combination of coins within three* attempts, he/she keeps the coins. Once played, the coin cannot be moved. *NOTE: *From experience, the parent determines the number of attempts allowed. The won coins could be part of an allowance.*

Quarters	Dimes	Nickels	Pennies	Sum of Coins
Place coins in boxes as shown and count.	○○○	○○○	○○	47¢
*	○○○○		○○○○	44¢
*	○	○○○○○	○○	37¢
*	○○○	○○	○○○	43¢
Correct	○○	○○○	○○○	38¢

Game compliments of Chopper Shrull

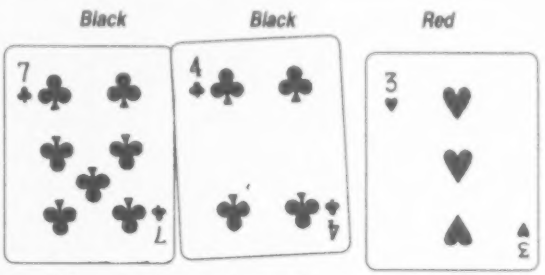
BEST COPY AVAILABLE

GAME FIFTY-TWO

Difference: Red and Black

(timed)

1. Remove the face cards from the deck. Use the 0-7 red cards, hearts or and diamonds (8 cards), and the 3-10 black cards, clubs and spades (16 cards), for a total of 24 cards. The red cards are negative (subtract) cards, and the black are positive (add) cards.
2. Shuffle or mix the cards separately, and place the two decks face down between the players.
3. One player turns two black cards; the other turns one red card. In a given period of time—perhaps five or six seconds to begin with—the learner might add the two black cards and "add up" from the red card to determine the difference. Remember, subtract is a dirty word. Example: Black 7 + black 4 = 11 and red 3 = 8. The thought process should be 3 and how many more = 11? 8. Can you see that by omitting 7 initially, 4 - 3 = 1, then 1 + 7 = 8? Another example is black 4 + black 4 = 8 then red 2 plus how many more = 8? 6. Can you see 4 - 2 + 4 = 6?

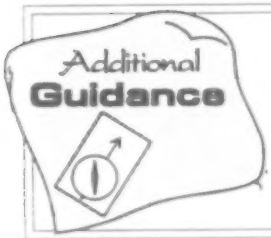


4. There may be a tendency for the learner to subtract from the total of the two black cards. This is okay when the spread is greater than 3 or 4. The larger the spread, the more sense it makes to count backwards.
5. The opportunity for cards to cancel to 0 will allow the learner to give an immediate response. Red 3, 4, 5, 6, and 7 and black 3, 4, 5, 6, and 7 are common; thus the odds are good that this will occur frequently. Example: black 9 + black 8 = 17 and red 9 (cancels a black 9) giving the answer of 8.
6. There is one chance the response will come up as -1. Example: black 3 + black 3 = 6 and red 7 = -1. Do not underestimate the ability of a 5- or 6-year-old to handle this concept.
7. Keep adjusting the number of seconds for a response, so that the learner can win most (not all) of the time. Score the rounds to five for a game.

Patience is a wonderful virtue
as my father used to say.

MOST IMPORTANT SKILL

Talk to the learner about negative differences. The reason this concept is hard for students in school is because math books teach subtraction, the smaller number "taken away" from the larger number (9 – 2 = 7). Imagine the confusion when a student has to deal with (–9) + 7 = (–2). When the concept is taught as a difference and the calculations are done in the head, it is much easier for the learner to think of minus (negative) as "you owe me" or "in the hole." There is no confusion with signs and calculations. The explanation might go like this: If you borrow and lose your friend's 3 micro machines, and you repay only 2, you still owe him/her 1. You are in the hole. Owing something is rational: –1 is abstract.



Spend some time sorting through the deck and picking out various black and red card assortments that are not more than 5 in the hole—or should I say less than 5 in the hole?

It is imperative that the parent acknowledge specifically the strategies which the learner uses. Ask him/her to explain why something works.

GAME FIFTY-THREE

Negative Difference: Red and Black

(timed or untimed)

1. Use the 1-10 cards and sort into a red deck and a black deck. Each deck will have 20 cards. Again, the black will be positive, the red negative.
2. Before beginning, use an object, say beans, and show that if the learner has 8 beans and gives away 6 to a friend, then there are 2 left, or 2 extra. Then demonstrate that if the learner has 6 beans and has to divide them among 8 friends, he will still owe 2 (see below).
2. To begin the game, each player draws one card from each deck at the same time.
3. The players must identify the difference between the two cards and determine whether it is "owed" or "extra." Perhaps you will want to continue modeling the difference using beans.
4. It may be better not to time this activity at first but take the opportunity to talk each problem over after each turn. As the learner picks up the concept, it will be fun to go back to a timed situation. Use your judgment.
5. The learner eventually will be able to refer to "owed" or "in the hole" as minus and something left over, or extra as plus. These words usually will be in the learner's vocabulary; however, it might be necessary to brush up on the meanings.

The writer's grandson, Cody, eventually got to the point where he could determine the sum of six red and black cards played in sequence from a shuffled deck. Remove the 7-10 cards, black and red, from the deck before attempting all 42 cards. With older children in the family, red and black combinations can be fun. Game Fifty-Three can be played as double or triple draw from each deck. Watch the children learn to cancel giving these multiple combinations.

If you wish to teach critical thinking, very few activities rival this one, which employs most of the skills learned thus far.

Who said this was easy?

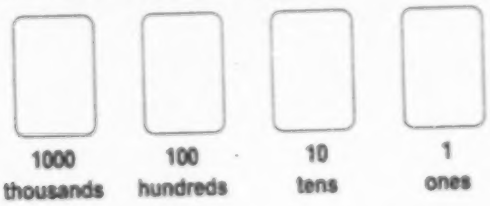
BEST COPY AVAILABLE

GAME FIFTY-FOUR

Place Value

(untimed)

1. Create a deck using the 0-5 cards, 22 cards in all.
2. On a piece of paper, using one card as a template, draw four card shapes in a row. Label each shape as shown below: Make one of these for each player. Place a sheet in front of each player so it can be read by the player.
3. Place the deck face down where each player can reach it.



4. Do not use the hundreds or thousands spaces initially. They may be covered up to prevent confusion.
5. To begin, each player draws a card from the deck and places the card either on his/her ones or tens blank space. Draw a second card and place it on the remaining blank space.
6. The object is to be the player with the highest number. It is easy to see that the first choice is critical since the first and second draw may not be interchanged.
7. Use a separate piece of paper for scoring. Players receive a slash mark for having the highest number. Ten slashes (or points) wins the game.
8. After a while, add the hundreds and thousands blanks.
9. After playing that high numbers win, it is easy to switch to low numbers win.

MOST IMPORTANT SKILL

The Place Value game progresses to triple draw (three cards), hundreds and quadruple draw (four cards), thousands (high and low). The learner will soon get the idea that the largest card needs to go in the thousands position if high numbers win and in the ones position if low numbers win. This is great practice for reading numbers and understanding the significance of each place position. The number 5,421 is read five thousand four hundred twenty-one, not five thousand four hundred and twenty-one. A decimal number, 4.5, is designated as four and five tenths.

GAME FIFTY-FIVE

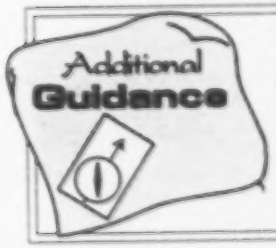
Place Value With Addition

(untimed)

1. Use the same deck as in Game Fifty-Four.
2. Each player gets a full sheet of paper and a pencil. The parent should make the first set of lines as shown in columns and rows. The learner can make the lines for future rounds. The number at the left of the set of lines represent the round played.

1	_____	_____	_____	_____
	_____	_____	_____	_____
Total	_____	_____	_____	_____

3. Each player draws a card, in turn, and places it face up in a row for all players to see. As the card is turned, the player writes the number of the card on one of his/her eight single lines. He/She should make sure that the other players do NOT see where the number is placed. Eight cards eventually will be drawn, and all players will use those same eight numbers.
4. After all numbers are placed, the columns are added, and the sum of each is put on the double lines at the bottom (See page 86).
5. The game can be scored as high number wins or low number wins. Try both ways! A win earns a player a slash mark, and the first player to reach five (or ten) slashes wins.



There may be a problem if 5s are placed in the same place-value position, which would mean the learner would have to carry. This being the case and as it has not been learned, a rule should be established that prevents this from happening: Don't play two 5s in the same place-value position.

If benefits outweigh the time commitments and risks, parents and the learner will be successful.

It is obvious that subtraction may or may not work unless only seven cards are drawn to ensure that the top number is greater than the bottom number to make subtraction possible.

An example of two players' game sheets after eight draws might look like this:

PLAYER ONE					PLAYER TWO				
1.	4	5	0	2	1.	3	2	4	1
	4	3	2	1		4	5	0	2
Total	8	8	2	3		7	7	4	3

Perhaps this is an opportune time to teach the concept of carrying. If older children are involved in this game, cards 0-9 can be utilized creating a broad range of decisions. A further challenge would be to take this to hundred thousands, or a total of six columns.

Advanced Hints

Let me help you.

GAME FIFTY-SIX

Combinations of 15 or Magic Square

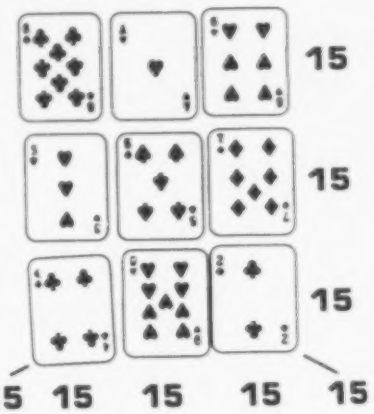
1. In this game, in preparation for the game of Cribbage which follows, the learner is introduced to sets of 15, three cards in each set. The magic square is used as a reinforcer.
2. Let's take a look at all the possibilities of 15 using a set of 1 through 9 cards. All are repeated three times, but for the purpose of developing an understanding of how a magic cube works, it is necessary. For example, 1 + 6 + 8, 6 + 1 + 8, and 8 + 1 + 6 are all possible combinations totaling 15.

1+6+8=15	2+4+9=15	3+4+8=15	4+2+9=15
1+5+9=15	2+5+8=15	3+5+7=15	4+3+8=15
	2+6+7=15		4+5+6=15
5+1+9=15		7+2+6=15	
5+2+8=15	6+1+8=15	7+3+5=15	8+1+6=15
5+3+7=15	6+2+7=15		8+2+5=15
5+4+6=15	6+4+5=15	9+1+5=15	8+3+4=15
		9+2+4=15	

3. Actually, using the 1-9 cards there are only eight different sets of three with the sum of 15:

   1+5+9; 1+6+8; 2+6+7; 2+9+4; 2+5+8; 3+5+7; 3+4+8; 4+5+6

   It is fun to see how many sets the learner can find given unlimited time. It is necessary to write each set down to keep from repeating. Note all the different strategies the learner must use when adding in random order. There is a system of sorts.
4. Looking back to #2 in the directions, it will be noted that combinations which include the number 5 occur four times, while combinations with 2, 4, 6, and 8 occur three times and combinations with 1, 3, 7, and 9 occur only twice.
5. A magic cube has nine squares, and the sums horizontally, vertically, and diagonally must be 15. To develop a magic square, ask the learner to place the 1-9 cards in order to achieve this. It will be a challenge. Whether doing it by trial and error or strategically, it is a worthwhile and mind-stretching activity.



Game Fifty-Six continued

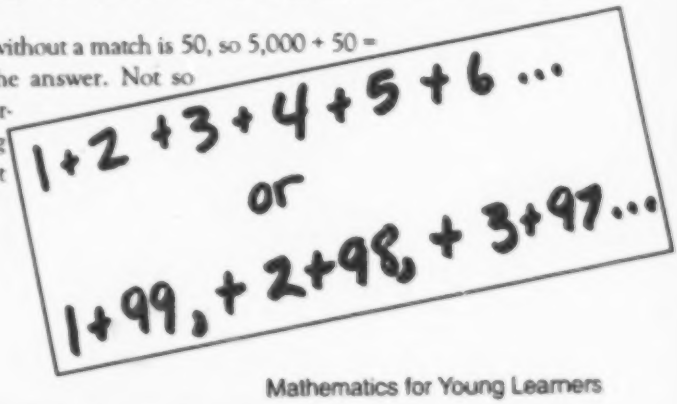
6. The strategic secret is to notice that the number 5 occurs in four sets of three. This being the case, it must be located in the middle of the magic square. Since the 2, 4, 6, and 8 occur in three sets, they must each be located in a corner. The 1, 3, 7, and 9 are easy to fit in once you get to this point. They only occur in two sets of three.
7. How is it determined how many different sets of nine numbers can be used in magic squares? The numbers 1-9 work because 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45, and 45 ÷ 3 = 15. Forty-five divided by three equals fifteen, which becomes the designated sum for all squares. Since the magic square is a 3 x 3 matrix, the designated sum must therefore be a multiple of three.
8. Let's try the numbers 2-10; 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 54; 54 ÷ 3 = 18. Will this work? Yes, because 18 is divisible by 3. What number do you think goes in the middle of the magic square? Try it first with cards by trial and error. Then check it by determining the sets of 18.
9. Try 3-11, where the jack is 11; 4-12, where the queen is 12; and 5-13, where the king is 13. If you really want to get carried away with the magic square, try 11-19 or 21-29! Don't forget, we started all this to introduce sets of 15 for the game of Cribbage.

GAME FIFTY-SEVEN

Adding 0 - 100

(timed)

1. A special challenge was offered back in Game Thirty-One to add the numbers 0 to 100 in less than three minutes. Give up?
2. It will be noted that each number 0-100 has a partner which adds up to 100. Example: 0 + 100 = 100; 1 + 99 = 100; 2 + 98 = 100, etc.
3. You eventually work your way to 49 + 51 = 100, which makes a total of fifty sets of 100 or 5,000.
4. The only number without a match is 50, so 5,000 + 50 = 5,050, which is the answer. Not so simple? The importance of developing math strategies must now be clear.



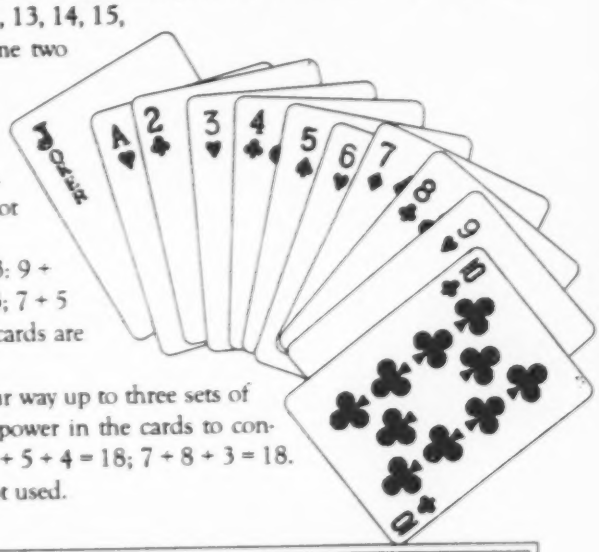
The writer developed the following game on a driving trip to California. Tyson was just six years old at the time; Cody was two. This game kept Tyson busy from St. George, Utah, to Las Vegas, Nevada. He discovered that when he moved to a higher set, he had to eliminate two cards with a value three less than the previous set. Thus he learned not to waste so much time determining which of the 11 cards to use. Incredible!

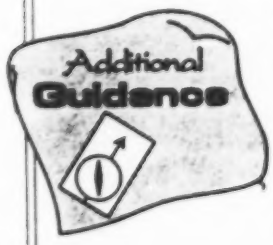
GAME FIFTY-EIGHT

Combinations from 12 to 18

(untimed)

1. Using one set of 0-10 cards (11 cards), it is possible to make three sets of three cards which add up to 12, 13, 14, 15, 16, 17, and 18. Each time two cards will not be used.
2. Begin with three sets of 12: 8 + 3 + 1 = 12; 7 + 5 + 0 = 12; 6 + 4 + 2 = 12. The 9 and 10 cards are not used.
3. Next, find three sets of 13: 9 + 4 + 0 = 13; 8 + 3 + 2 = 13; 7 + 5 + 1 = 13. The 6 and 10 cards are not used.
4. By the time you work your way up to three sets of 18, there is not enough power in the cards to continue: 10 + 6 + 2 = 18; 9 + 5 + 4 = 18; 7 + 8 + 3 = 18. The 0 and 1 cards are not used.



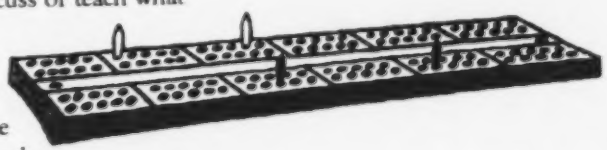


Again, the solutions should be discovered by trial and error. The game becomes cumbersome if the learner doesn't have any idea of the quantity of the two cards not used. If needed, hold out the 3 and 10 cards for three sets of 14; the 0 and 10 cards for sets of 15; the 0 and 7 cards for sets of 16; and the 0 and 4 cards for sets of 17—each time increasing by 3 the total sum of the three sets. Help the learner see what is happening if he/she doesn't pick it up. Simple, isn't it?

GAME FIFTY-NINE

Cribbage

1. Purchase a good Cribbage board that is divided into segments of five or ten for ease of counting as you move the pegs ahead.
2. Read the rules.
3. To begin, deal each player four cards from a full deck, and cut one from the deck. This eliminates the confusion of determining which two cards to discard in the crib.
4. Peg the count that represents the value of each hand. The dealer gets to count and move his/her pegs first. The dealer alternates from player to player.
5. Next, deal each player six cards and discard two to the crib. The major challenge of this game is knowing which cards to keep and which ones to discard to the crib. This is something that is learned through practice. Because of the hundreds of possible combinations of six cards, it does little good to review each hand and discuss or teach what might have been.



6. Finally, add the cards to 31 as they are played, and take the count for pairs and runs as they occur. Follow all the rules, and play the game as designed.

Author's Remarks

Even after a year of playing several games a week, Cody is still learning to make decisions. He trots out the Cribbage board nearly every night before going to bed—of his own accord. This is the most natural math lesson in the world . . . and practice does make perfect. He wins far too frequently for my competitive spirit.

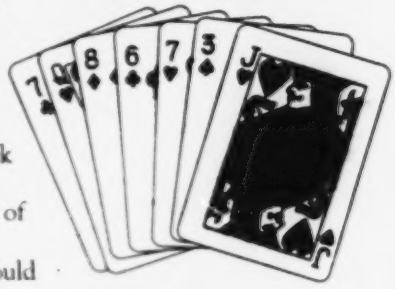
GAME-SIXTY

Junior Rummy

The most popular card game in the United States is Rummy. Played for a penny a point, the game becomes more interesting. Four can play the game; however, it will be described for two players.

1. Using all 52 cards, the parent (player one) shuffles and deals seven cards face down to the learner (player two) and seven to himself/herself. The object is to form all seven cards into matched sets referred to as melds:

Cards as dealt



   a. A group of three or more cards of the same suit in consecutive order.

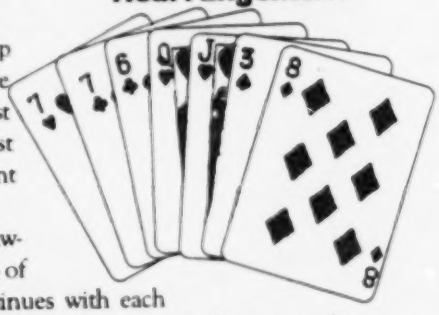
   Example: jack, queen, king of clubs, or ace (one) two, three of diamonds.

   —or—

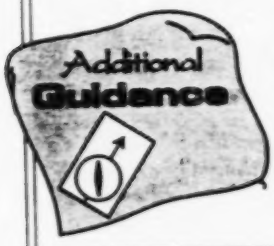
   b. Three or four of a kind. Example: jack of spades, jack of hearts, jack of diamonds; or 9 of spaces, 9 of diamonds, 9 of clubs.

2. As the dealt cards are picked up, they should be rearranged in order of their meld possibilities. The learner may have some difficulty doing this at first.

Rearrangement



3. Player two begins by drawing the top card from the deck and adding it to the seven cards he/she holds. He/She must decide which of the cards is of least value. This card is discarded adjacent to the deck.
4. Player one then has the option of drawing the discard or a card from the top of the face-down deck. The game continues with each player picking and discarding until one player can meld all seven cards.
5. If player one is first to meld seven cards, player two may lay down those cards that form a three- or four-card meld. Those with no match are counted at face value (ace = 1, two = 2 . . . jack, queen, and king = 10) and the points are added to player one's score.
6. Allow ten points for winning. The game may end in an agreed-upon time period, when one player wins five games, or when one player gains a 25-30 point advantage. The learner should keep score by adding or subtracting in a single column noting the winning player's running subtotal.



It is not a good idea to hold cards with a large face value too long. Observe carefully what your opponent draws and discards as a clue to what he/she needs to "Rummy." Consider whether holding for runs or multiples is advisable. Graduate to Gin Rummy when this game is mastered.

My grandchildren: Ryan, Tyson, Kara, Cody, and Kyle—all straight A math students.

BEST COPY AVAILABLE

Answers to Activity I

from page 73.

Sums of 4 to equal 24

10 + 10 + 1 + 3
10 + 9 + 1 + 4
10 + 8 + 1 + 5
10 + 7 + 1 + 6
10 + 10 + 2 + 2
10 + 9 + 2 + 3
10 + 8 + 2 + 4
10 + 7 + 2 + 5
10 + 6 + 2 + 6
9 + 9 + 1 + 5
9 + 8 + 1 + 6
9 + 7 + 1 + 7
9 + 6 + 1 + 8
8 + 8 + 7 + 1
8 + 7 + 7 + 2
8 + 6 + 7 + 3
8 + 5 + 7 + 4
7 + 7 + 8 + 2
7 + 7 + 7 + 3
7 + 6 + 7 + 4
7 + 5 + 7 + 5
6 + 6 + 6 + 6
6 + 6 + 5 + 7
6 + 6 + 4 + 8
6 + 6 + 3 + 9

5 + 5 + 6 + 8
5 + 5 + 5 + 9
5 + 5 + 4 + 10
4 + 10 + 8 + 2
4 + 10 + 7 + 3
4 + 10 + 6 + 4
4 + 10 + 5 + 5
4 + 9 + 5 + 6
4 + 9 + 4 + 7
4 + 9 + 3 + 8
4 + 9 + 2 + 9
3 + 9 + 9 + 3
3 + 8 + 9 + 4
3 + 7 + 9 + 5
3 + 6 + 9 + 6
3 + 5 + 9 + 7
3 + 4 + 9 + 8
3 + 3 + 9 + 9
2 + 9 + 9 + 4
2 + 9 + 8 + 5
2 + 8 + 9 + 5
2 + 8 + 8 + 6

Sums of 3 Subtract 1 to equal 24

10 + 10 + 5 - 1
10 + 10 + 6 - 2
10 + 10 + 7 - 3
10 + 10 + 8 - 4
10 + 10 + 9 - 5
10 + 10 + 10 - 6
9 + 10 + 6 - 1
9 + 10 + 7 - 2
9 + 10 + 8 - 3

9 + 10 + 9 - 4
9 + 9 + 7 - 1
9 + 9 + 8 - 2
9 + 9 + 9 - 3
9 + 9 + 10 - 4
8 + 8 + 9 - 1
8 + 8 + 10 - 2
8 + 7 + 10 - 1

Engineer's Problem

$7 \times 3\frac{3}{7} = 24$

About The Author

Richard Ellerby graduated from high school and attended the University of Wyoming with a mind set to become a petroleum engineer. Although math was difficult for him since childhood, he was not willing to give up his dream, until he failed analytical geometry and trigonometry in college. He made a switch to geology, which circumvented any future frustrations with math.

After becoming dissatisfied with his nomadic role, he returned to the university to pursue a career as a secondary science teacher. To his horror, his student teaching experience included an advanced class in physics. This, along with a deficiency in math and chemistry, led him to apply for and be accepted for a sixth grade teaching position—even without the proper certification.

At the age of 32 he had, at last, found his niche. Mathematics at the sixth-grade level was easy to understand, and he became quite a good teacher. Two years later Ellerby accepted a position as an elementary school principal. Within eight years he had persevered to receive his doctorate degree in administration.

A short while later an experience with a special education student, Robbie Hollis, created a major transformation in his thinking. A fourth-grade teacher had told him that Robbie couldn't learn his multiplication tables, but Ellerby couldn't and wouldn't believe it. He even made a bet with the teacher that it could be done.

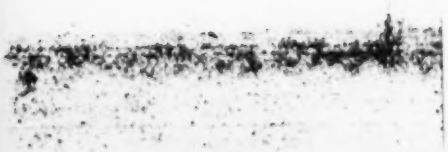
Ellerby worked with Robbie daily for about 15 minutes. It took him only two and a half hours to tailor a system, using right-brained techniques, to accomplish this formidable task. He discovered that anything can be learned if presented at the student's level of understanding and within the background of his/her experience.

From this "framework," Ellerby began to use what he had learned with his grandchildren . . . from whence came the beginning of this book. Since then he has helped hundreds of students become strategic thinkers rather than rote processors.

"I share this book with parents, because teachers are very much entrenched within the system and not likely to believe in the 'magic' contained herein," Ellerby said.

BEST COPY AVAILABLE

- Notes -



Easy to Teach Math Skills ...
with a Deck of Cards

Mathematics for Young Learners

This book will:

- Show you how math can be interactive
- Allow you to work one on one with young people solving math problems
- Help your child(ren) learn to problem solve using cards
- Make math fun and entertaining
- Help young people learn how to strategize

What others are saying:

"*Mathematics for Young Learners* is a great resource for teachers and parents. We have found that using it is a wonderful way to help parents with ideas on how to spend quality time with their children."

Sue Sonnenberg, Assistant Principal
Clark County School District
Las Vegas, Nevada

"I have successfully used the strategies in *Mathematics for Young Learners* to teach the first summer school class in the district for pre-kindergarten children."

Calvin Shrull, Teacher
Lopez Elementary
Fort Collins, Colorado

"I like the games very much and they are cool."

Corey Wood
Student

About the Author:

Richard Ellerby, Ed.D. is the principal of William Lopez Elementary School in Fort Collins, Colorado.

ISBN 0-9623300-1-9
9 780962 330018
51295>

$12.95

109